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Chemical and Morphological Variance in Vitriclastic Shards from IODP Site U1437: Inferences about Source Regions and Eruptive Mechanisms

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Chemical and Morphological Variance in Vitriclastic Shards from IODP Site U1437: Inferences about Source Regions and Eruptive Mechanisms

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Senior Thesis

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1. Background & Introduction

International Ocean Discovery Program (IODP) Expedition 350 recovered core consisting of ~2000 meters of volcaniclastic material from the western (rear) side of the Izu Arc, representing the last 15 million years of arc activity (Tamura et. al., 2015 & Heywood, 2018, Figures 1 & 2). The goal was to produce a stratigraphic record of volcanism within this region. My study focuses on tiny (<150 micron) shards of volcanic glass (ash) dispersed in tuffaceous mud in the upper 100 m of this core (<1 million years old) in order to address questions about eruptive mechanism (determined from shard morphology) and source (using potassium content as proxy) of the ash. Shards with <1.1 wt.% K_2O (low K) are diagnostic of eruptions sourced from the volcanic front (East) whereas shards with >1.1 wt.% K_2O (medium K) are diagnostic of eruptions either from a western source local to the drill site (the rear arc) or the SW Japan arc (Gill et. al., 2018 and references therein). Volcanic front eruptions and SW Japan eruptions are typically subaerial (above sea level) or shallow subaqueous (slightly below sea level), whereas any rear arc eruptions would necessarily be deep submarine. My study is a proof of concept: are eruption style differences discernible in shard morphology? If so, then, absent trace elements, this could be a way to distinguish between the sources of medium K and low K glass shards.

The importance of this project lies in the fact that medium K glass shards are surprisingly plentiful in the <1 million-year-old muds, and this poses a problem for their origin. If these are derived from the rear arc, then this means that 1) < 1 million-year-old local rear arc eruptions were common, and this has not previously been documented, and 2) submarine explosive eruptions that produce fine ash are rarely documented, and this study could present evidence of their existence over a broad period of time.

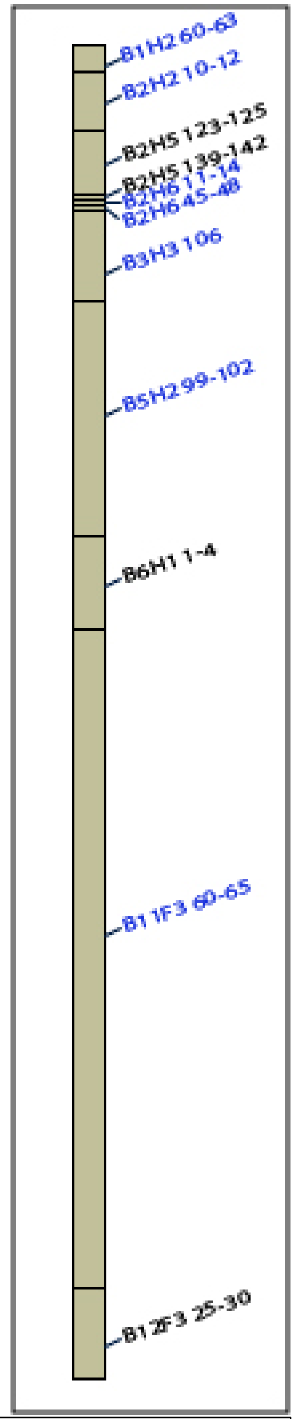

Figure 1: Displays stratigraphic section of first 97m of core drilled at site U1437.Intervals in blue represent those deposited during glacial periods and intervals in black represent those deposited during interglacial periods.

My main goal was to determine whether or not submarine, locally sourced explosive eruptions in the rear arc dominate the vitriclastic component of this exceptionally thick section of mud deposited in the rear arc. To do this, I determined the distribution of low-K and med-K shards over the last million years and whether or not those distributions vary between glacial and interglacial periods or between fine- and coarse-grained shards. This is important as it determines shard origin as well as depositional period and environment. These geochemical classifications are shown in Table 1.

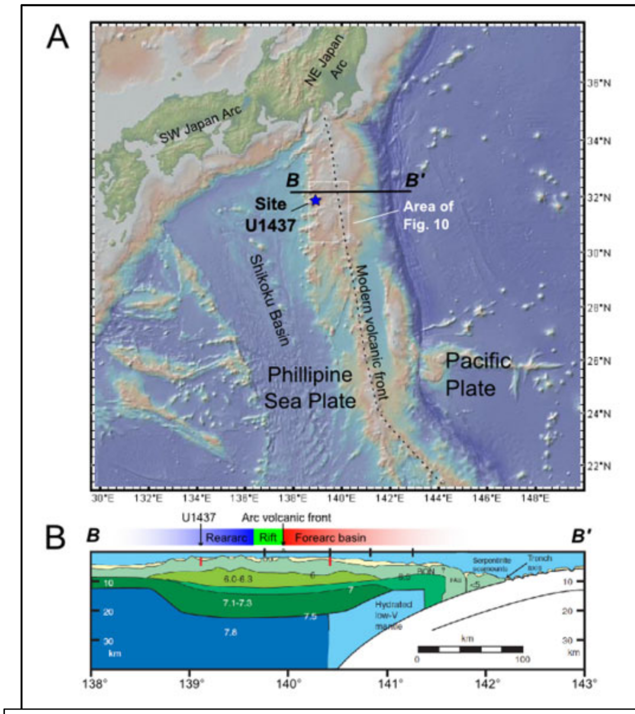

Figure 2: Izu Arc showing locations of the volcanic front, rift zone, and rear arc in a topographic and cross-sectional view (Heywood, 2018).

Category	Low-K Andesite	Low-K Dacite	Low-K Rhyolite	Med-K Andesite, Dacite	Med-K Rhyolite
Abbreviation	**AGLK**	**DGLK**	**RGLK**	**ADGMK**	**RGMK**
Source	**VF**	**VF**	**VF**	**RA**	**RA**
Criteria					
SiO2	51-62%	63-70%	71-80%	59-68%	71-80%
K2O	<.9%	<1.1%	<1.1%	>9%	>1.1%
CaO/Al2O3	N/A	N/A	>.20	N/A	<.20
TiO2	N/A	N/A	>.6%	N/A	<.9%

	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SiO2	**58.6**	1.8	**67.1**	2.6	**74.4**	2.3	**63.5**	6.3	**77.2**	2.1
Al2O3	**13.7**	1.2	**13.9**	1.1	**12.5**	0.7	**13.2**	2.2	**12.4**	0.9
TiO2	**1.3**	0.2	**1.1**	0.2	**0.8**	0.2	**1.3**	0.8	**0.5**	0.2
FeO	**11.5**	1.6	**7.0**	1.7	**3.8**	1.0	**10.2**	6.7	**2.3**	0.8
MgO	**3.4**	1.0	**1.6**	0.5	**0.7**	0.2	**1.8**	0.1	**0.4**	0.2
CaO	**7.9**	0.9	**5.2**	1.1	**3.1**	0.5	**5.9**	1.4	**1.7**	0.5
Na2O	**2.1**	0.5	**2.9**	0.6	**3.1**	0.5	**2.5**	0.3	**3.3**	0.8
K2O	**0.5**	0.1	**0.7**	0.2	**0.8**	0.2	**1.3**	0.6	**1.6**	0.7
CaO/Al2O3	**0.6**	0.1	**0.4**	0.1	**0.2**	0.0	**0.5**	0.2	**0.1**	0.0

Table 1: Displays chemical composition classification scheme for all vitriclasts analyzed within this study. Note that the cutoff for low vs. medium K was 1.1% K2O unless both CaO/Al2O3 and wt. % TiO2 indicated otherwise (Gill et. al., 2018).

To discern whether the medium-K shards (rear arc) formed sub-aqueously, morphologic data was collected to find features of the shards such as rectangularity, compactness, solidity, and convexity (Liu et. al., 2015). Rectangularity and convexity provide descriptors of the textural roughness of the shards (perimeter-based estimate of surface roughness) while solidity and compactness represent the morphological roughness (spatial distribution of particle area) of each shard (Liu et. al., 2015). If the shards formed sub-aqueously, one would expect to see a higher ratio of solidity to convexity, indicating that the shard contained less vesicles and formed under hydrostatic pressure (Figure 3). If the shards formed subaerially, one would expect to see the opposite, a lower ratio of solidity to convexity, indicating a higher percentage of vesicles.

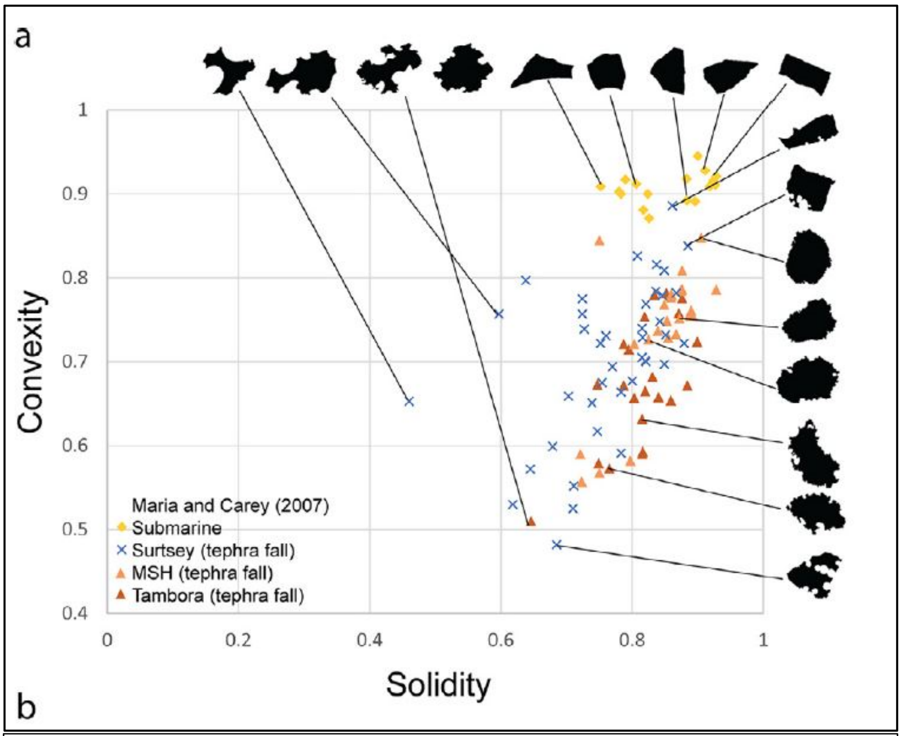

Figure 3: Image from Liu et. al. (2015) which displays endmember types of convexity to solidity ratios. Submarine (subaqueous eruptions are shown in yellow and would represent what I expected to see in med-K shards.

Other morphologic features were analyzed to further show whether or not the med-K shards formed sub-aqueously. These features include area, aspect ratio, breadth, form factor, length, perimeter and shape of each shard. Area and perimeter of each individual shard is important as it shows if there are any distinguishable size differences between low-K and med-K shards. If the medium-K shards formed sub-aqueously they would be expected to have a larger area and larger perimeter than the low-K shards. The aspect ratio provides us with a way of describing the form of each shard (Liu et. al., 2015). Aspect ratio is measured by using a best-fit ellipse around the shard itself. To do this the major axis is compared with the minor axis of the best fit ellipse in order to represent the sphericity of the shard (Liu et. al., 2015). Shards with a higher sphericity (aspect ratio) are representative of subaqueous eruptions while shards with a smaller aspect ratio are more representative of a subaerial eruption. Breadth and length are ways of describing the width and elongation of each shard. If the med-K shards formed sub-aqueously their breadths and lengths should be fairly equal since they would have formed under hydrostatic pressure. The low-K shards should then have variable breadths and lengths because the larger amount of vesicles within the shard can alter the uniform shape of the shard. Form factor is another way of describing the form and roughness of each shard and is synonymous with the shard's roundness (Liu et. al., 2015). A smaller form factor indicates the shard contained more vesicles and therefore the med-K shards are expected to have a larger form factor than the low-K shards.

Also, if the medium-K shards formed sub-aqueously, they would be expected to contain fewer and smaller vesicles than the low-K shards which must have formed subaerially. Because of this, vesicles within individual shards were examined to find any correlation between vesicle dimensions and potassium classification.

Studying shard and vesicle morphology is pertinent to this study as it would allow me to determine the probable eruptive environment of each shard which leads to the answer of whether or not site U1437 has been dominated by deposition of submarine, rear-arc related volcanic products over the last million years. A summary of all morphologic features analyzed and what they indicate for eruptive environment can be found in Table 2.

	Solidity	Convexity	Area & Perimeter	Aspect ratio	Breadth & Length	Form factor	Rectangularity	Compactness	Vesicle dimensions
Subaqueous	Area of the shard divided by the area of convex hull is closer to 1 as the area is shaped by fewer vesicles	Perimeter of the shard divided by the perimeter of the convex hull is closer to 1 as the perimeter is shaped by fewer vesicles	The shard has a larger area and perimeter because of less fragmentation	Major axis of a best-fit ellipse around the shard divided by the minor axis is closer to 1 indicating a higher sphericity and less vesicles	Breadth and length should have similar, nearly equal values indicating the shards formed under hydrostatic pressure	Four pi times the area of the shard divided by the perimeter of the shard squared is closer to 1 indicating fewer vesicles and higher roundness	Higher rectangularity (perimeter of grain divided 2 times the length and width of the bounding rectangle) indicates fewer vesicles	Higher compactness (area of grain divided by the length and width of the bounding rectangle) indicates fewer vesicles and more compact	Smaller vesicle dimensions (diameter, area, eccentricity) indicates less/smaller vesicles
Subaerial	Area of the shard divided by the area of convex hull is less than 1 as the area is shaped by more vesicles	The perimeter of the shard divided by the perimeter of the convex hull is less than 1 as the perimeter is shaped by more vesicles	The shard has a smaller area and perimeter because of more fragmentation and farther distance travelled	Major axis of a best-fit ellipse around the shard divided by the minor axis is less than 1 indicating a lower sphericity and more vesicles	Breadth and length values are variable indicating more vesicles which alter the uniformity of the shard	Four pi times the area of the shard divided by the perimeter of the shard squared is less than 1 indicating more vesicles and a lower roundness	Lower rectangularity (perimeter of grain divided 2 times the length and width of the bounding rectangle) indicates more vesicles	Lower compactness (area of grain divided by the length and width of the bounding rectangle) indicates more vesicles and less compact	Larger vesicle dimensions (diameter, area, eccentricity) indicates more/larger vesicles

Table 2: Displays expected morphological characteristics for subaqueous (rear-arc) and subaerial (front arc) explosions that were analyzed (Liu et. al., 2015).

2. Methods

2.1 Grain Mount Creation and Polishing

In order to get chemical and morphologic data of individual shards within the mud samples, each interval needed to be made into its own grain mount. To do this, the mud was previously acid leached to dissolve any carbonates (foraminifera) and sieved into two fractions: >123 microns and <123 microns (Gill et. al., 2018). The original samples looked like gray colored unlithified mud with no discernable grains (Figure 4). Randomly sorted grains from this mud sample were then placed in a metal ring which was taped to a piece of polished marble. The ring was then filled with an epoxy which encased the mud sample and was left to dry under room temperature conditions in an enclosed cabinet. Grain mounts were made for all fine-grained intervals within this study as well as three coarse-grained intervals not previously studied.

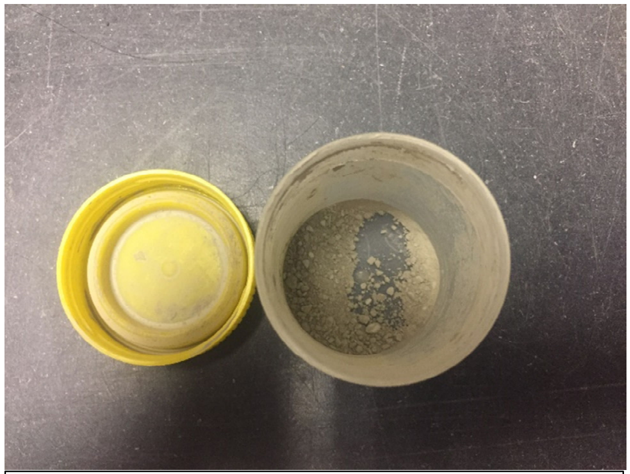

Figure 4: Image of the unlithified fine-grained fraction of interval B3H3 106.

Once the grain mounts were dried and hardened, they were pushed out of the ring mold and were polished. To polish the grain mounts, 1200 grit waterproof silicon carbide sanding sheets were used to achieve smooth flat surface. The grain mounts were moved in a figure-eight pattern on the sanding sheets under lightly applied pressure in order to maintain an even polish and to not damage the tiny shards. After a flat surface was achieved, I then polished the grain mounts using 15-, 16- and 1-micron diamond paste on a spinning lap wheel. I started with the 15-micron diamond paste and worked my way down to the 1 micron paste in order to smooth out the surface of the grain mount and to not damage the shards. For each grain mount, roughly 30-45 seconds of polishing was required per diamond paste grit size. After all polishing was completed and checked underneath a microscope, the grain mounts were coated using a carbon coater and kept in a dry area until analyzed with a JEOL SEM (Figure 5).

Figure 5: Image of finished grain mount that has been carbon coated and marked to designate different quadrants of the mount.

2.2 Gathering Chemical Data

The chemistry of glass shards was determined using a Japan Electron Optics Laboratory (JEOL) Scanning Electron Microscope (SEM). Each sample was loaded into the JEOL SEM and data was gathered by using the follow settings: an accelerating voltage of 15Kev, a process time of 4, a working distance of 10.00mm and a probe current of 10. After all of the settings were in order, twenty to thirty shards per grain mount were analyzed depending on how many total shards were in the grain mount itself. Three different spots were chemically analyzed per shard. If the results from those three spots seemed off from each other, a fourth, or sometimes even fifth, point was analyzed on the shard. Areas with smooth topography and uniform composition were targeted on each shard for chemical data collected. Shards were then classified based on their chemistry, med-K versus low-K andesites, dacites, or rhyolites (Table 1).

2.3 Gathering Morphologic Data

In order to gather complete morphologic data per shard, two programs were used which include AzTEC software as well as Adobe Acrobat DC. First, AzTEC software was used in order to isolate each individual shard from any background options/noise within the BSE image taken on the SEM. The feature tool on the AzTEC software was applied, and the spectrum was adjusted to only include material with the exact chemical composition/brightness of the shard itself (Figure 6). From this, the AzTEC software was able to calculate the area, aspect ratio, breadth, length, perimeter and shape of each individual shard. I also used the Aztec software to calculate the length and width of the bounding rectangle of each shard. The bounding rectangle is a rough estimate of the shard's size that includes empty space where air bubbles (vesicles) are likely located. The dimensions of the bounding rectangle allowed me to calculate rectangularity (perimeter of grain divided by the perimeter of the bounding rectangle) and compactness (area of grain divided by area of the bounding rectangle) of each shard (Liu et. al., 2015).

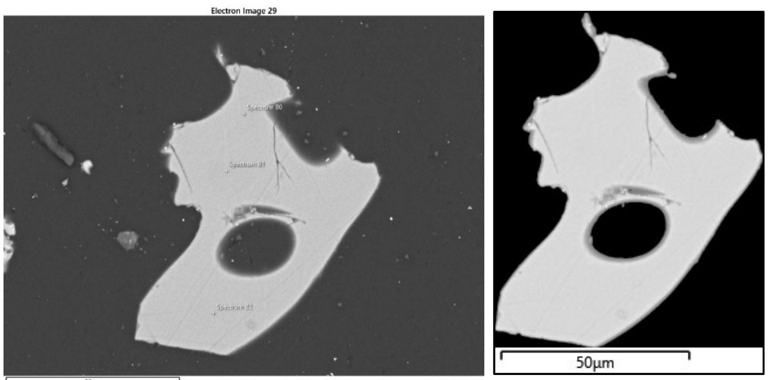

Figure 6: Shows original BSE image of shard AA from interval B2H5 123-126 (left) and the isolated image of the same grain created by the AzTEC software and feature tool (with all extraneous grains removed).

In order to calculate more morphologic features for each shard, I used Adobe Acrobat DC to calculate the area and perimeter of the convex hull of each grain. The convex hull is similar to the bounding rectangle in that it allows me to estimate the size of individual shards including all empty space which vesicles occupy; however, the convex hull is slightly more refined than the bounding rectangle as a rough polygon is drawn around the shard instead of a broad rectangle that encompasses empty space that may not be occupied by a vesicle. This allowed me to use the scale of the isolated image that the AzTEC software created, to measure the area and perimeter of a rough polygon drawn around each individual grain (Figure 7). These measurements allowed me to use the convex hull to calculate the solidity (area of the actual shard divided by the area of the convex hull) and the convexity (perimeter of the convex hull divided by the perimeter of the actual shard (Liu et. al., 2015).

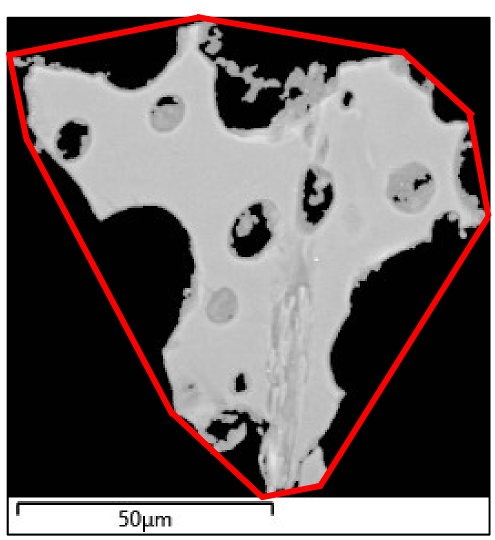

Figure 7: Shows the drawn in polygon, representing the convex hull, of shard C from interval B2H6c 45-48 which was used to calculate the solidity and convexity of this grain.

2.4 Determining Morphology of Vesicles

I obtained vesicle morphology within shards from the coarse-grained fraction of each interval. In order to do this, Adobe Acrobat DC was used to get the length of the major and minor axis of each vesicle (which were generally ellipsoidal in shape) with respect to the scale of the isolated image created by the AzTEC software (Figure 8). By doing so, I was able to calculate the average vesicle diameter (using the mean of major and minor axis), the area of each vesicle, and the eccentricity of the vesicles.

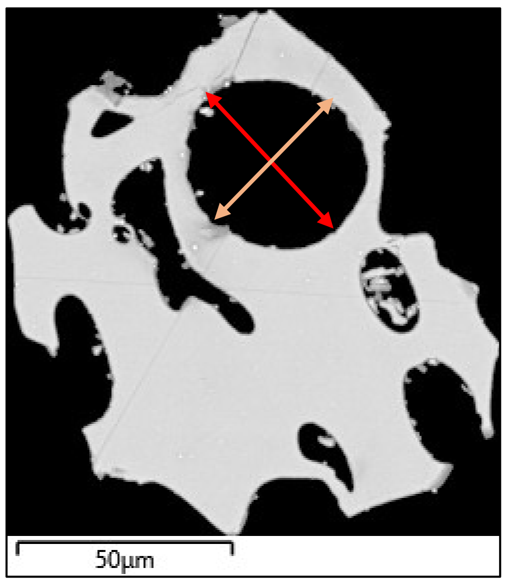

Figure 8: Shows the major axis (red) and minor axis (orange) of a vesicle within shard AA from the coarse-grained fraction of interval B2H5 139-142.

3. Results

3.1 Chemistry by Interval

I analyzed roughly 400 particles (377 glass shards and 26 minerals) in 7 mud intervals that are less than 1 million years old. I analyzed particles in both a coarse fraction (4 intervals) and a fine fraction (3 of the same as the coarse fraction plus 3 others that have a coarse fraction previously analyzed and presented in Gill et al., 2018).

Shard chemistry ranges from andesite (52%– 62% SiO2) to dacite (63-70% SiO2) to rhyolite (>70% SiO2). Following the methods of Gill et al. (2018), these shards were classified according to their K content. Of the roughly 400 shards analyzed, the largest percentage are rhyolite (Table 2 and Appendix I). The more mafic shards (andesite and dacite), are most commonly of the low K variety, with dacites being more common than andesites.

	B1H2 60-63*	B2H2 10-12*	B2H5 123-126	B2H5 139-142	B2H6 11-14	B2H6 45-48	B3H3 106	B5H2 99-102*	B6H1 1-4	B11F3 60-65*	B12F3 25-30*	Totals
Low-K												
Andesite (AGLK)			1				14	2	11	1		29
Dacite (DGLK)	3		21		1	7	16	9	10	2		69
Rhyolite (RGLK)	23	3	8	10	25	5	21	13	8	1	26	143
Med-K												
Andesite & Dacite (AGMK)		1				2					1	4
Rhyolite (RGMK)	14	7	8	18	3	8	6	18	28	7	15	132
Non-Vitriclastic	2		2	2		4	13	1	2			26

Table 2: Interval, and number of low-K andesite, dacite and rhyolite as well as medium-K andesite/dacite and rhyolite are shown comparatively in stratigraphic order. Data from intervals marked with * also include data from previous work that can be found in Gill et. al (2018).

Minerals analyzed include plagioclase and pyroxenes. These are presented in Table 3 as non-vitriclastic shards. Percent Anorthite ranges from 38.65% to 99.71% and magnesium content in pyroxenes range from 66.55% to 87.60%.

Interval	Shard	Classification	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	% An or Mg#
B2H6c 123-126	A	Plag	5.05	0.05	27.26	56.32	0.04	0.00	10.23	0.04	0.02	0.98	100	69.13
B2H6c 123-126	AC	Pyroxene	0.15	15.33	2.47	51.56	0.01	0.00	17.41	0.65	0.56	11.85	100	69.75
B2H6c 11-14	E	Plag	5.71	0.00	27.34	56.64	0.23	0.05	9.53	0.00	0.10	0.40	100	64.85
B2H6c 11-14	AA	Plag	4.10	0.29	28.32	53.65	0.08	0.06	12.23	0.08	0.00	1.19	100	76.73
B2H6c 11-14	Q	Plag	6.69	0.03	25.20	60.18	0.06	0.09	7.38	0.04	0.00	0.34	100	54.94
B2H6c 45-48	K	Plag	3.12	0.63	15.46	71.29	0.22	4.42	1.78	0.64	0.08	2.38	100	38.65
B3H3c 106	L	Quartz	0.04	0.03	0.01	99.80	0.11	0.00	0.00	0.01	0.00	0.00	100	---
B3H3c 106	R	Pyroxene	0.25	14.82	2.20	51.70	0.04	0.02	18.88	0.44	0.55	11.12	100	70.37
B3H3c 106	S	Plag	4.50	0.13	27.48	55.91	0.09	0.02	10.93	0.03	0.05	0.90	100	72.88

B3H3c 106	C	Plag	4.89	0.04	28.62	54.87	0.10	0.03	10.95	0.04	0.04	0.42	100	71.22
B3H3c 106	G	Plag	4.27	0.07	29.25	53.34	0.09	0.03	12.13	0.07	0.02	0.73	100	75.86
B3H3c 106	M	Plag	4.78	0.21	23.29	61.94	0.01	0.07	8.10	0.20	0.01	1.38	100	65.19
B6H1c 11-14	B	Plag	3.24	0.18	28.36	53.78	0.12	0.00	12.85	0.07	0.07	1.33	100	81.42
B6H1c 11-14	T	Quartz	0.03	0.01	0.01	99.80	0.05	0.03	0.01	0.01	0.00	0.05	100	---
B1H2 60-63	P	Plag	1.64	0.12	33.57	47.41	0.12	0.01	16.35	0.04	0.02	0.72	100	91.68
B2H5 123-126	I	Pyroxene	0.05	20.94	1.09	52.97	0.00	0.01	5.39	0.18	0.60	18.76	100	66.55
B2H5 123-126	O	Plag	4.88	0.09	28.13	54.44	0.00	0.10	11.38	0.05	0.00	0.93	100	72.05
B2H5 123-126	V	Plag	3.85	0.10	28.56	54.84	0.03	0.03	11.70	0.05	0.03	0.84	100	77.05
B3H3 106	A	Plag	7.69	0.01	23.82	62.74	0.12	0.26	5.28	0.03	0.01	0.04	100	43.13
B3H3 106	B	Plag	4.43	0.06	28.96	54.29	0.05	0.31	11.26	0.07	0.05	0.52	100	73.76
B3H3 106	Q	Plag	2.65	0.16	32.01	49.90	0.10	0.06	14.43	0.00	0.03	0.66	100	85.75
B3H3 106	R	Plag	5.59	0.06	26.81	57.93	0.08	0.40	8.83	0.05	0.02	0.24	100	63.56
B3H3 106	V	Pyroxene	0.24	15.81	2.17	54.38	0.07	0.04	22.83	0.34	0.13	3.99	100	87.60
B3H3 106	Y	Plag	0.07	0.03	25.24	40.83	0.05	0.05	22.59	0.11	0.56	10.46	100	99.71
B5H2 99-102	R	Plag	1.30	0.08	33.42	47.82	0.02	0.01	16.52	0.04	0.00	0.80	100	93.35

Table 3: Displays the chemistry for all non-vitriclastic minerals analyzed per interval.

In the following presentation of results, I focus only on the distinction between low- versus medium-K shards, no matter the Si content, as that is the most reliable indicator of the location of origin. All intervals show some mixture of low- and medium-K shards, no interval is purely one or the other (Table 4). It is important to note that fine-grained fractions were not analyzed for every interval and that individual shard chemistries can be found in Appendix I.

	Coarse Shards		**Fine Shards**	
Interval	Low-K	Med-K	Low-K	Med-K
B1H2 60-63*	6	6	21	7
	50% low-K & 50% med-K		72% low-K & 28% med-K	
B2H2 10-12*	3	8	---	---
	27% low-K & 73% med-K		---	
B2H5 123-126	24	4	26	3
	86% low-K & 14% med-K			
B2H5 139-142	10	19	---	---
	35% low-K & 65% med-k		---	

B2H6 11-14	26	4	---	---
	87% low-K & 13% med-K		---	
B2H6 45-48	12	10	---	---
	54% low-K % 46% med-K		---	
B3H3 106	18	1	20	3
	95% low-K & 5% med-K		87% low-K & 13% med-K	
B5H2 99-102*	8	5	16	13
	62% low-K & 38% med-K		55% low-K % 45% med-K	
B6H1 1-4	11	3	8	21
	79% low-K % 21% Med-K		28% low-K & 72% med-K	
B11F3 60-65*	4	7	---	---
	36% low-K % 64% med-K		---	
B12F3 25-30*	0	11	27	5
	100% med-K		84% low-K & 16% med-K	

Table 4: Interval, and number of low-K and med-K shards per coarse- and fine-grained fraction comparatively shown in stratigraphic order as well as relative percentages of low-K vs. med-K shards. Data from intervals marked with * was taken from previous work that can be found in Gill et. al (2018).

To summarize, all analyzed intervals have a mixture of both low-K and medium-K shards with varying proportions of each per interval. In the coarse fraction, the majority (six out of ten) intervals have over 50% low-K shards whereas the coarse fraction of the remaining four intervals are dominated by medium-K shards; however, in general, intervals dominated by medium-K shards still contain a significant proportion of low-K shards]. Most of the medium-K shards within this study have 1.1-1.5% K2O and a smaller percentage have >1.5% K2O. The lowest value of K2O within a shard is 0.35 and the highest value of K2O is 3.0% (Appendix I).

3.2 Chemistry During Glacial and Interglacial Periods

Schindlbeck et al. (2018) found a distinct periodicity in eruption intervals recorded at Site U1437B using tephra layers, with an upswing of eruptions corresponding to the transition to interglacial. In addition, Gill et al. (2018) found a distinct difference in mud components during glacial versus interglacial periods, interpreting the difference to be due to the transport of Asian loess to the drill site during glacial periods by the Kuroshio current.

Given these variations, I wanted to see whether there was a corresponding change in eruption source (medium versus low K) during glacial versus interglacial periods. I compared intervals deposited during glacial periods and intervals deposited during interglacial periods to see whether there are differences in proportions of low-K and med-K shards between them (Table 5). Intervals deposited during glacial periods include B1H2 60-63, B2H2 10-12, B2H6 11-14, B2H6 45-48, B3H3 106, B5H2 99-102, and B11F3 60-65. Intervals deposited during interglacial periods include B2H5 123-126, B2H5 139-142, B6H1 1-4, and B12F3 25-30. I found a discernable difference in proportion of low-K versus med-K shards in intervals deposited during glacial periods compared to those deposited during interglacial periods; however, this difference was determined to not be statistically significant (Figures 9 & 10).

	Coarse Shards		**Fine Shards**	
Depositional Period	Low-K	Med-K	Low-K	Med-K
Glacial	78	40	57	23
	66% low-K & 34% med-K		71% low-K & 29% med-K	
Interglacial	45	29	61	29
	61% low-K & 39% med-K		68% low-K & 32% med-K	

Table 5: Depositional period, number of shards of low-K and med-K chemistry, and relatively percentages of each are comparatively shown between glacial and interglacial periods as well as coarse- and fine-grained fractions.

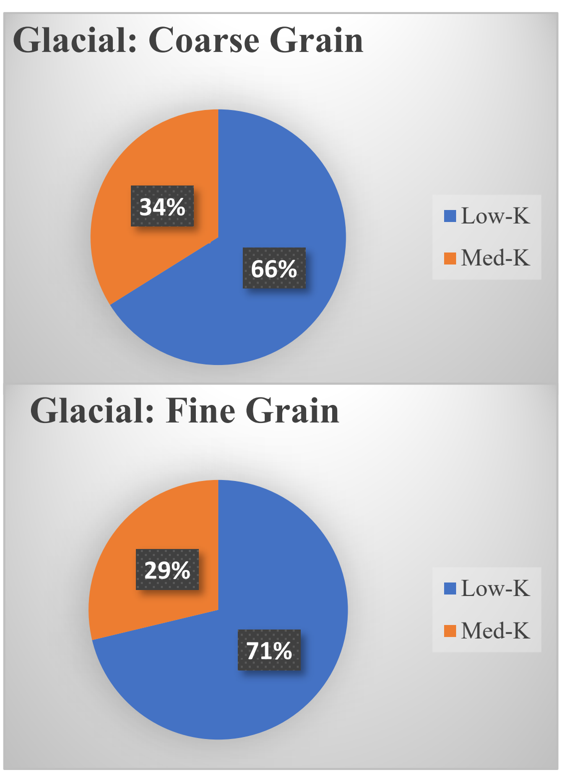

Figure 9: Displays proportions of low-K and med-K shards in coarse- and fine-grained fractions within intervals deposited during glacial periods.

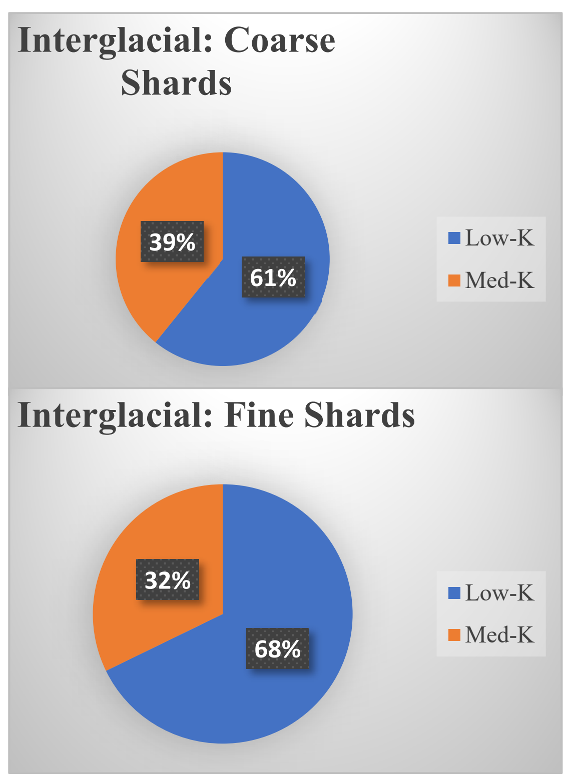

Figure 10: Displays proportions of low-K and med-K shards in coarse- and fine-grained fractions within intervals deposited during interglacial periods.

3.3 Chemistry of Coarse- and Fine-Grained Samples within the same Interval

I observed that the proportions of low-K and med-K shards varied by size fraction. For example, interval B1H2 60-63(Figure 11) has 50% low-K shards within the coarse-grained fraction but only 23% low-K shards within the fine-grained fraction. Most intervals have either greater or similar amounts of low-K shards in the fine fraction, with the notable exception of B6H11-4. (Figures 11 through 16).

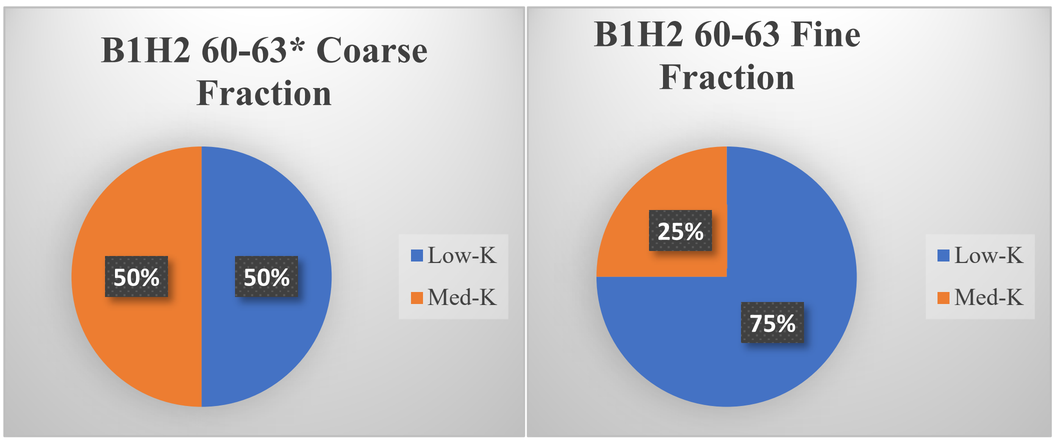

Figure 11: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B1H2). Data from fraction marked with * is from Gill et. al. (2018).

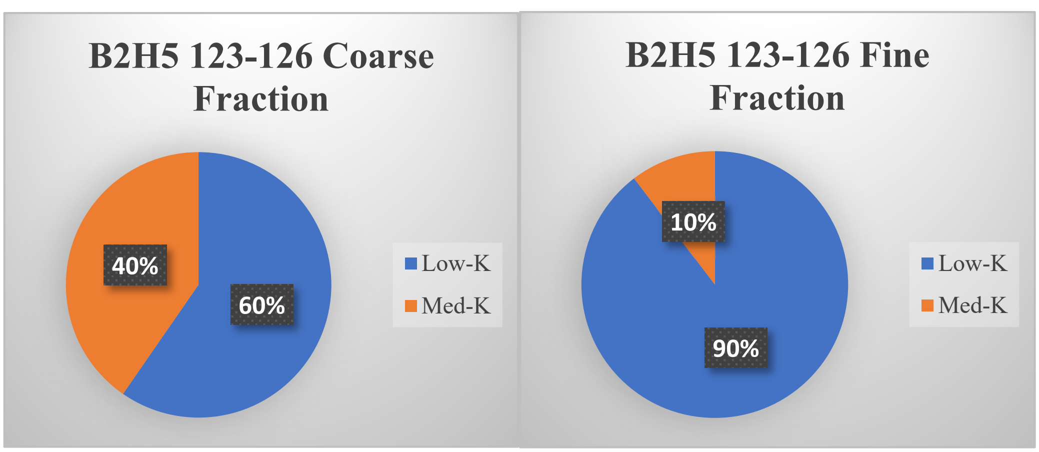

Figure 12: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B2H5).

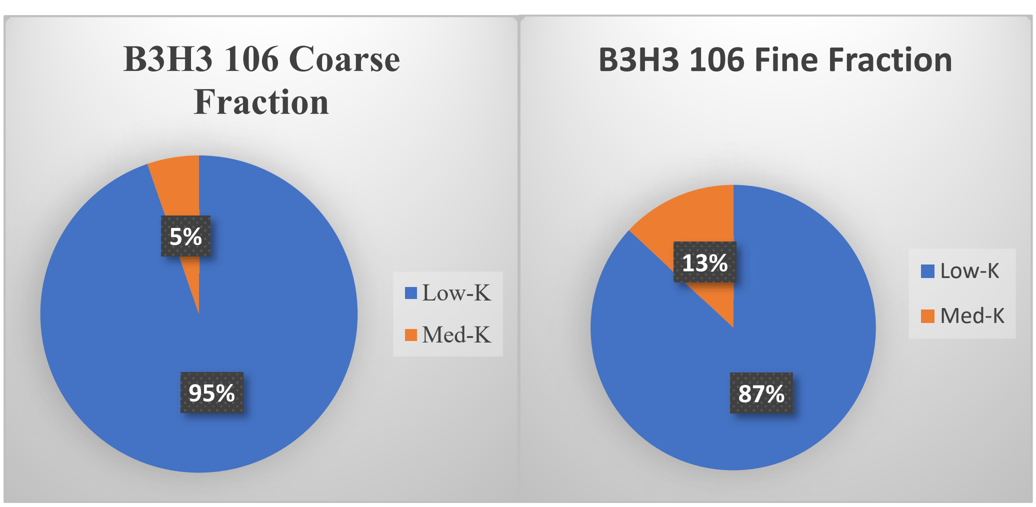

Figure 13: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B3H3).

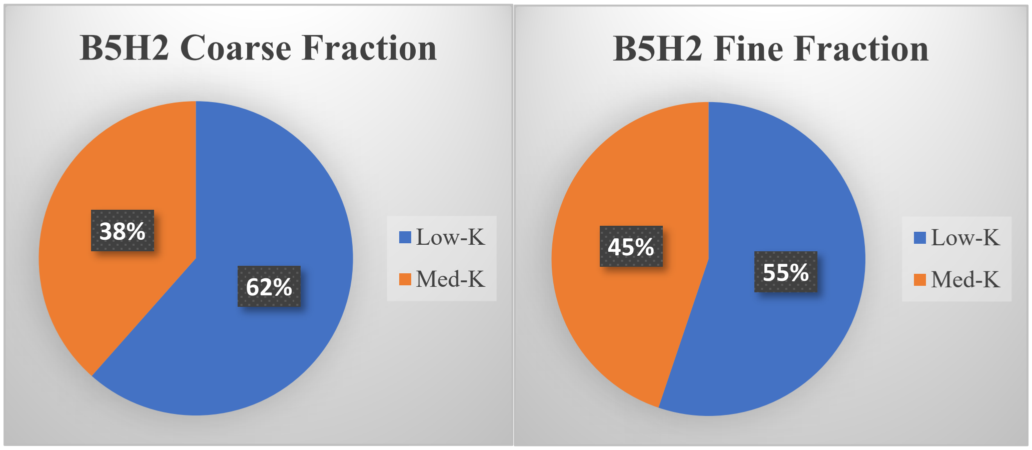

Figure 14: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B5H2). Data from fraction marked with * is from Gill et. al.(2018).

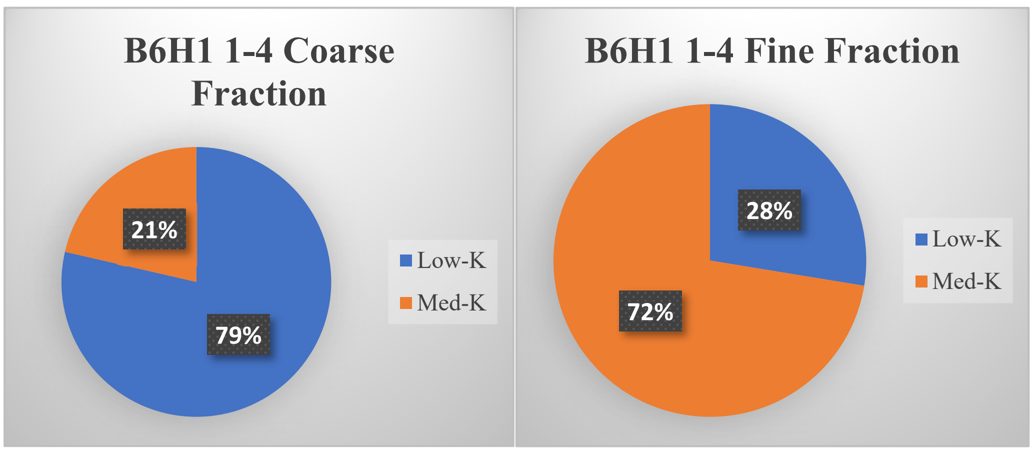

Figure 15: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B6H1).

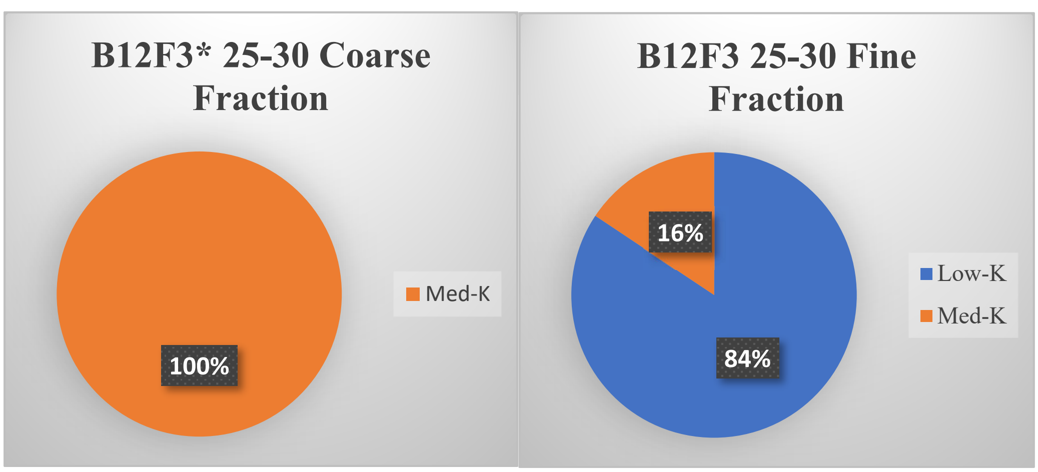

Figure 16: displays differences in proportions of low-K versus med-K shards between coarse- and fine-grained fractions of the same interval (B12F3). Data from fraction marked with * is from Gill et. al. (2018).

3.4 Shard Morphology

After all chemical analyses were completed, I performed morphologic analyses, comparing the form factor, circularity, rectangularity, compactness, solidity, and convexity of each interval.

I looked at changes over time, from older to younger intervals. The data show that there is no distinct trend in the characteristics for any of the aforementioned morphologic properties through the stratigraphic record (Table 6). Through the progression of time that these samples represent, the morphologic features remain steadily similar. Differences in average area and perimeter of the shard are due to some intervals containing a higher abundance of coarse-grained shards than fine-grained and do not have an effect on the morphologic properties.

Interval	K-Level	Area	Perimeter	Form Factor	Circularity	Rectangularity	Compactness	Solidity	Convexity
B1H2 60-63	Low	492.63	243.21	0.14	3.06	1.95	0.62	0.69	0.51
	Med	270.89	176.11	0.13	3.16	1.68	0.42	0.59	0.53
B2H5 123-126	Low	2624.86	673.14	0.09	3.85	2.35	0.51	0.72	0.40
	Med	2552.60	621.27	0.09	3.75	2.36	0.59	0.64	0.42
B2H6* 11-14	Low	3272.84	774.85	0.11	3.84	2.22	0.46	0.63	0.44
	Med	5080.03	1095.93	0.08	4.52	2.76	0.60	0.66	0.37
B3H3 106	Low	1834.49	539.16	0.11	3.65	2.26	0.51	0.71	0.40
	Med	1544.69	721.70	0.06	5.02	2.89	0.45	0.59	0.32
B5H2 99-102	Low	268.58	114.88	0.30	2.05	1.23	0.52	0.72	0.70
	Med	325.78	151.22	0.25	2.37	1.34	0.55	0.68	0.67
B6H1 1-4	Low	2293.45	427.08	0.13	3.02	1.85	0.52	0.68	0.49
	Med	1466.23	307.87	0.18	2.81	1.60	0.50	0.67	0.58
B12F3 25-30	Low	389.42	188.53	0.16	2.81	1.56	0.49	0.61	0.57
	Med	449.13	296.11	0.09	3.82	2.21	0.50	0.63	0.43

Table 6: Shows intervals in stratigraphic order, potassium level, area, perimeter, form factor, circularity, rectangularity, compactness, solidity & convexity.

I also looked at the ratio of convexity to solidity to determine whether there were any differences between low-K and med-K shards throughout the stratigraphic record (Table 7). I found that there is no trend in the convexity to solidity ratio between low-K and med-K shards or between the younger and older intervals. As seen in Figure 17, the ratio of convexity to solidity is very similar between low-K and med-K shards.

Interval	K-level	Convexity/Solidity
B1H2 60-63	low	0.74
	med	0.9
B2H5 123-126	low	0.56
	med	0.65
B2H6 11-14	low	0.69
	med	0.55
B3H3 106	low	0.57
	med	0.55
B5H2 99-102	low	0.97
	med	0.98
B6H1 1-4	low	0.73
	med	0.86
B12F3 25-30	low	0.93
	med	0.68

Table 7: Displays intervals in stratigraphic order, K-level, and convexity to solidity ratio.

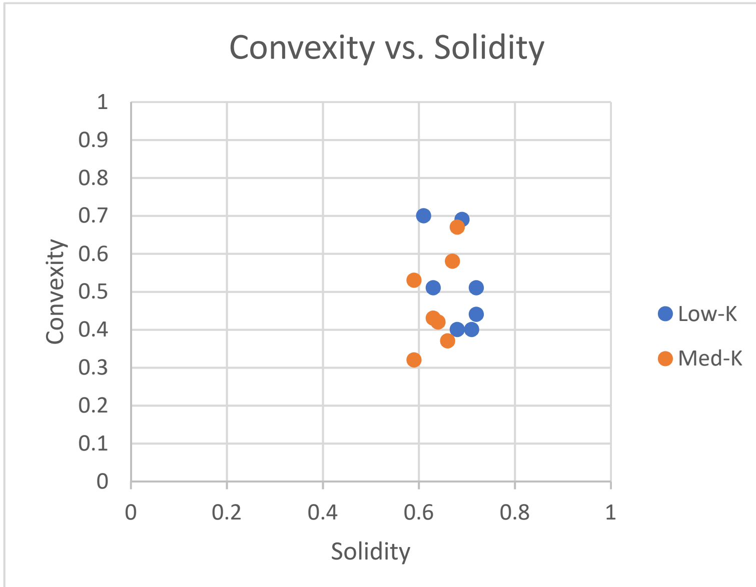

Figure 17: Shows convexity versus solidity between low-K and med-K shards.

3.5 Shard Morphology During Glacial and Interglacial Periods

I also compared shard morphology between glacial and interglacial periods. The same features analyzed above (form factor, circularity, rectangularity, compactness, solidity, & convexity) were analyzed again but between intervals deposited during glacial periods and those deposited during interglacial periods (Table 8). No distinct differences were noticed in morphologic features between glacial and interglacial periods (Figure 18). This is consistent with the shard morphology by interval (above) as the shards do not show a change with morphologic features with a progression of time or period.

Depositional Period	K-Level	Area	Perimeter	Form Factor	Circularity	Rectangularity	Compactness	Solidity	Convexity
Glacial	Low	1467.13	418.02	0.16	3.15	1.92	0.53	0.69	0.51
	Med	1805.35	536.24	0.13	3.77	2.17	0.51	0.63	0.47
Interglacial	Low	1769.25	429.58	0.13	3.22	1.92	0.51	0.67	0.49
	Med	1489.32	408.42	0.12	3.46	2.06	0.53	0.65	0.48

Table 8: Depositional Period, potassium level, area, perimeter, form factor, circularity, rectangularity, solidity, and convexity comparatively shown between glacial and interglacial periods.

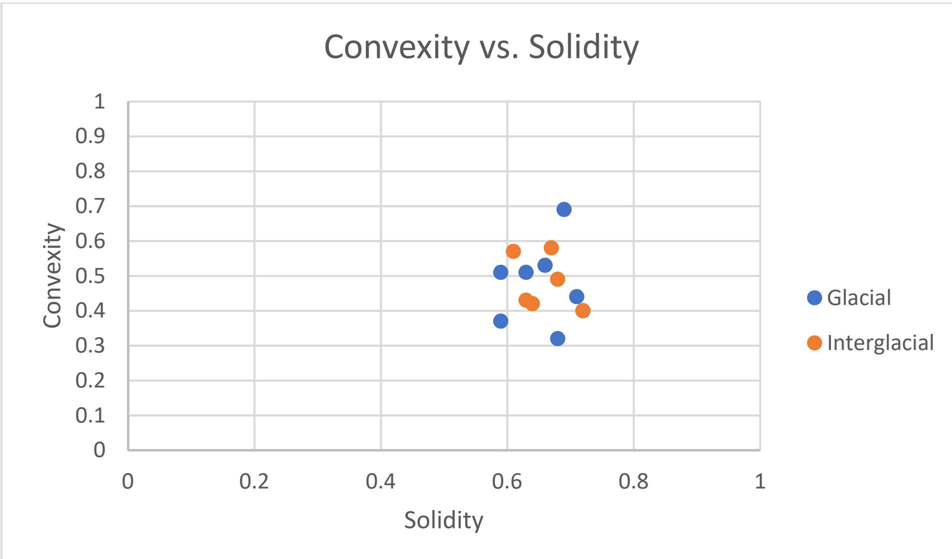

Figure 18: shows convexity versus solidity between glacial and interglacial depositional periods.

3.6 Shard Morphology of Coarse- and Fine-Grained Samples within the same Interval

Although differences were noted in chemical data between coarse- and fine-grained samples within the same interval, there is no difference in shard morphology between coarse- and fine-grained samples from the same interval (Table 9). Any differences noted between the fine- and coarse- grained fractions are too small and therefore negligible (Figure 19).

Interval	Fraction	K-Level	Area	Perimeter	Form Factor	Circularity	Rectangularity	Compactness	Solidity	Convexity
B2H5 123-126	Fine	Low	865.89	349.78	0.11	3.47	2.09	0.50	0.60	0.47
		Med	825.61	404.23	0.07	4.05	2.53	0.55	0.63	0.36
	Coarse	Low	3504.35	834.81	0.08	4.03	2.48	0.52	0.78	0.37
		Med	3416.09	729.80	0.11	3.60	2.28	0.60	0.65	0.45
B3H3 106	Fine	Low	645.94	316.39	0.12	3.46	2.27	0.58	0.71	0.43
		Med	723.34	340.45	0.09	3.65	2.22	0.50	0.67	0.40
	Coarse	Low	3023.04	761.93	0.09	3.85	2.24	0.45	---	0.38
		Med	2366.03	1102.95	0.02	6.40	3.56	0.40	0.50	0.24
B6H1 1-4	Fine	Low	586.91	292.40	0.10	3.46	2.09	0.49	0.63	0.44
		Med	474.73	221.33	0.13	3.01	1.70	0.43	0.59	0.53
	Coarse	Low	4000.00	561.76	0.17	2.57	1.61	0.54	0.72	0.53
		Med	2457.72	394.42	0.24	2.61	1.50	0.56	0.75	0.63

Table 9: Interval, fraction, potassium level, area, perimeter, form factor, circularity, rectangularity, compactness, solidity and convexity are displayed comparatively between fine- and coarse-grained fractions of the same interval.

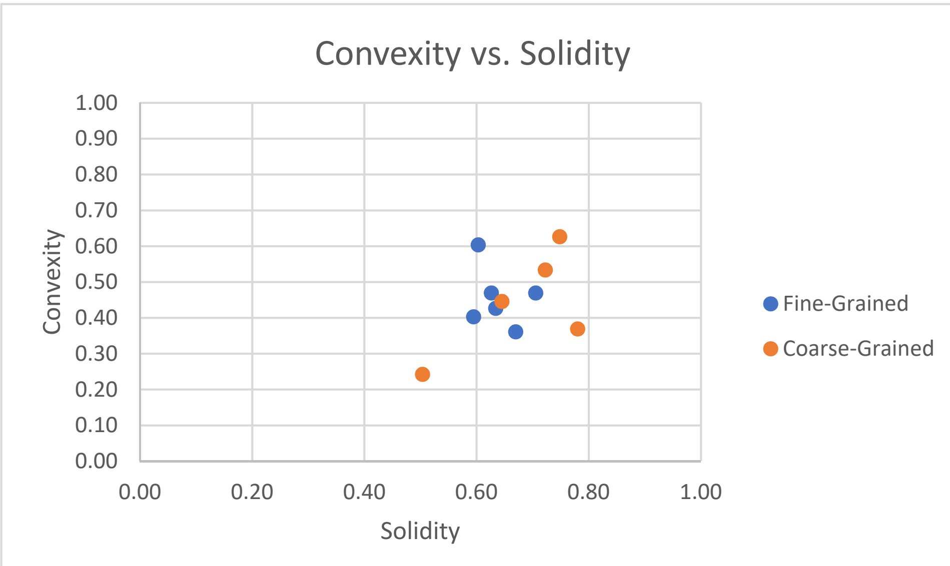

Figure 19: Shows convexity versus solidity between fine- and coarse-grained shards of the same interval.

3.7 Vesicle Morphology in Coarse-Grained Samples

I examined vesicle morphology to determine whether there were differences between low-K shards and med-K shards. Only coarse-grained samples were analyzed as they were determined to be the most representative samples of vesicle morphology (the fine-grained samples were more fragmented). I found that in half of the coarse-grained samples that the vesicles within shards of low-K composition were larger than in samples of med-K composition (Table 10 & Figure 20). However, the other half of the coarse-grained samples showed the opposite, that the vesicles within shards of med-K composition were larger than in samples of low-K composition.

Interval	K-Level	Major Axis	Minor Axis	Average Vesicle Diameter	Eccentricity	Area
B2H5 123-126	Low	26.10	9.12	17.61	0.93	218.07
	Med	21.27	14.36	17.82	0.87	271.75
B2H6 11-14	Low	19.54	10.92	15.23	.90	194.18
	Med	34.33	10.94	22.64	0.96	334.23
B3H3 106	Low	21.67	8.22	13.79	---	161.12
	Med	20.56	2.87	11.72	0.99	46.34
B6H1 1-4	Low	18.27	11.72	15.00	0.88	208.36
	Med	3.72	1.28	2.50	0.95	3.74

Table 10: Interval, potassium level, major axis length, minor axis length, average vesicle diameter, vesicle area, and eccentricity of the vesicles are displayed comparatively between coarse-grained fractions. Interval marked with * indicates that it is the sum of two interval (B2H6 11-14 & B2H6 45-48).

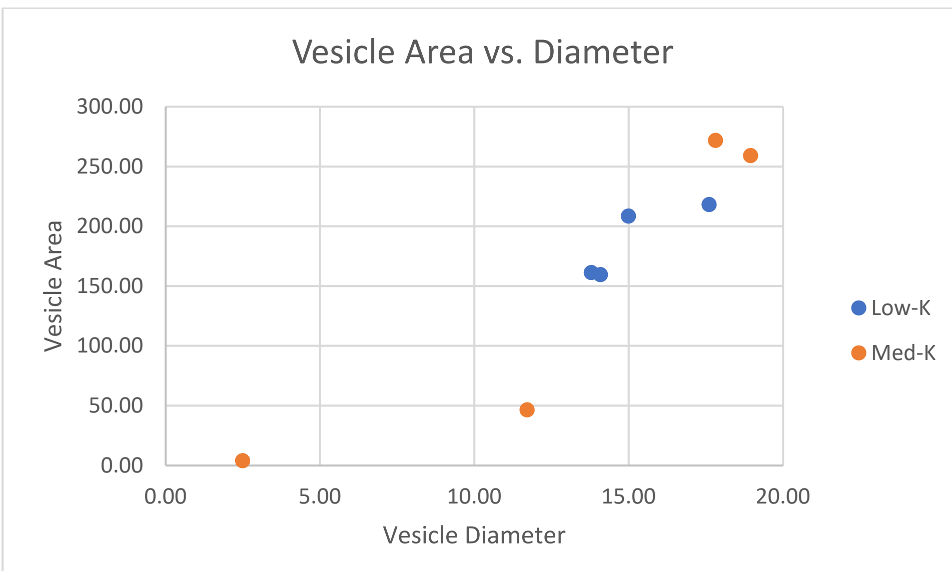

Figure 20: Vesicle area versus diameter between low-K and medium-K shards of coarse-grained fractions.

3.8 Vesicle Morphology in Coarse-Grained Samples During Glacial and Interglacial Periods

Similar to chemical and shard morphology data, vesicle morphology data was analyzed between glacial and interglacial periods to determine whether there are differences in vesicle morphology during those different times (Table 11 and Figure 21). From this it was determined that there is not a large difference in vesicle size between glacial and interglacial depositional periods.

Depositional Period	K-Level	Major Axis	Minor Axis	Average Vesicle Diameter	Eccentricity	Area
Glacial	Low	20.06	8.97	13.94	0.91	160.26
	Med	23.74	6.92	15.33	0.96	152.66
Interglacial	Low	22.19	10.42	16.30	0.91	213.21
	Med	12.50	7.82	10.16	0.91	137.74

Table 11: Depositional Period, potassium level, major axis, minor axis, average vesicle diameter, vesicle area and eccentricity are displayed comparatively between glacial and interglacial periods.

4.

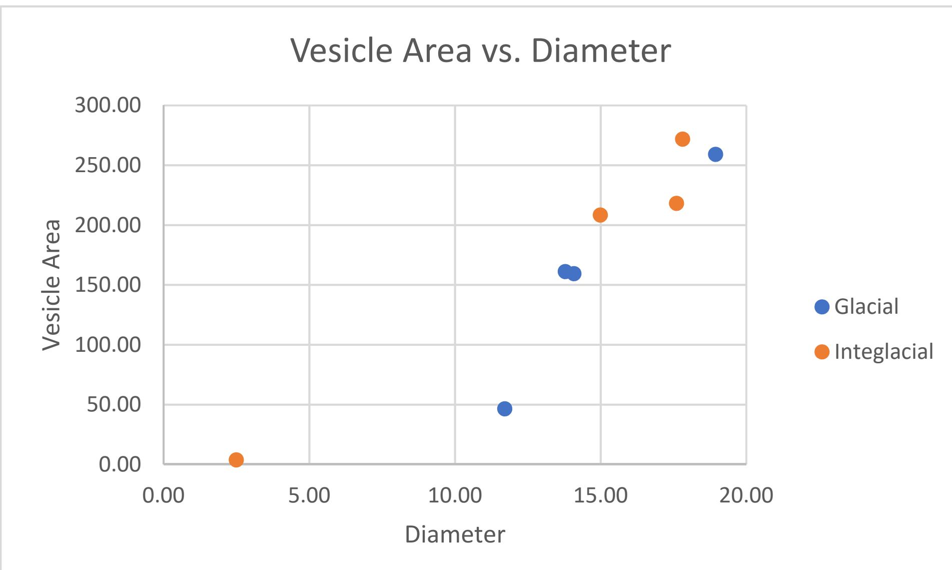

Figure 21: Vesicle area versus diameter between glacial and interglacial depositional periods.

Discussion

4.1 Chemical Data Interpretations

My goal for this study was to use the shard chemical data to make interpretations about the eruptive source and depositional environment. I found that the majority of the analyzed shards are low-K in composition (431 low-K shards compared to 136 medium-K shards). My interpretation of that distribution is that the location for site U1437 is a depositional environment for vitriclastic shards originating from the volcanic front. However, it is important to note that even in samples dominated by low-K shards there is still a significant proportion of med-K shards within the interval. This means that there is still a sufficient amount of background sediment deposited from either local rear-arc eruptions or by eruptions from SW Japan even though the highest proportion is from the highly active front arc.

One major takeaway from this research is that the proportion of med-K shards is progressively higher in the oldest cores (but only for the coarse-grained fraction) (Figure 22). This means that Site U1437 became more dominated by volcanic front arc sediment in younger times, and that with age, a medium K source was more common.

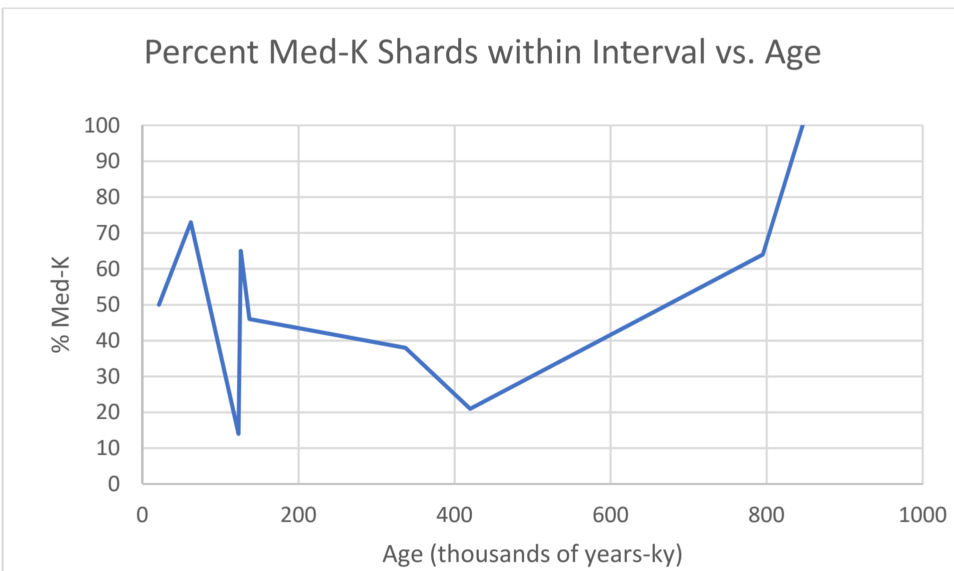

Figure 22: Shows relationship & increase in proportion of med-K shards with increasing age.

There is a slight increase in proportions of med-k to low-K shards during glacial periods in comparison to interglacial periods, but the differences are small and may not be statistically significant. Thus, there may be only minor to not change in source of ash between glacial and interglacial periods. From Gill et. al. we know that the westerly-sourced Kuroshio current passed over the drill site during glacial periods, therefore we might expect a smaller proportion of volcanic front-derived shards in the mud during these glacial times. But the differences are so small as to be insignificant.

Regarding coarse- and fine-grained fractions of the same interval, with the exception of one drastically different interval, the proportion of low-K shards in the fine-grained fraction is either greater than or similar to the proportion of low-K shards within the coarse-grained fraction. A higher proportion of low-K shards within the fine-grained fraction is likely an effect of the travel distance from the front-arc. In the oldest sample, B12F3 25-30 (which also shows how the proportion of med-K increases with age), the coarse-grained fraction is entirely composed of med-K shards while the fine-grained fraction contains a higher proportion of low-K shards. This supports the hypothesis that the fine-grained fraction contains more far-traveled low-K shards. Local (rear-arc) med-K shards are expected to be larger since they would not have travelled as far.

4.2 Morphologic Data Interpretations

The original intent of the morphological analysis was to determine whether the low-K samples (sourced unequivocally from the volcanic front) showed distinct morphological characteristics than the medium-K samples (sourced either locally or from Japan) that could relate to eruption mechanism (subaerial versus subaqueous). If morphological characteristics show that the medium K samples have characteristics common to subaqueous eruptions, this would be good evidence for a locally derived (rear arc) source. Characteristics that one would expect to see in a shard erupted sub-aqueously would be a high solidity to convexity ratio, a high compactness value, and a comparatively large form factor. This is in comparison to the low-K shards which had to have erupted subaerially, which should have a lower solidity to convexity ratio, a lower compactness value and a smaller form factor.

Results of the morphologic data show that there is no apparent relationship between potassium classification (low-K vs. med-K) and morphology. The lack of an observed relationship could indicate one of two things. It could mean that morphology is not a strong indicator of eruptive mechanism *or* it could mean that the med-K shards did not form sub-aqueously but instead formed in the same eruptive environment as the low-K shards (subaerially). If the reason is the latter of the two, it means that the med-K shards that we have assumed to be sourced from the rear-arc do not actually originate from the rear-arc at all but instead originate from the SW Japanese Arc. Trace element analysis of the shards by LAICPMS would be able to distinguish between the two interpretations.

There also appears to be no apparent relationship between depositional period (glacial & interglacial) and morphology. This suggests that morphology was not affected by changes in sea level or other effects of glaciation.

Lastly, there are no differences in morphology between coarse- and fine-grained fractions of the same interval. This means that morphology is not representative of coarse- or fine-grained fractions or it means that between the coarse- and fine-grained fractions there was no difference in eruptive environment.

4.3 Shard Vesicularity Interpretation

After vesicle morphologic data was analyzed, I found that there is no apparent correlation between vesicle size and eruptive source (potassium classification). Half of the intervals analyzed showed that vesicles in low-K shards were larger than that in med-K shards which could indicate that the low-K shards formed subaerially while the med-K shards formed sub-aqueously. However, the other half of the analyzed intervals showed the exact opposite, that vesicles within the med-K shards were larger than vesicles within the low-K shards. Due to the results being inconclusive, there is no definitive answer as to if vesicle area and diameter can indicate something about the eruptive source of each interval. It is possible that an increase in sample size would show a correlation between vesicle area/diameter and eruptive source, but the sample size of this project is determined to be large enough to show any definitive correlation. There is also no apparent relationship between vesicle size and depositional period (glacial & interglacial) which could mean that vesicle size has no relationship to depositional period or that the vesicle size was not dependent upon depositional period.

5. Conclusion & Summary

Seven different intervals within Unit One of the core drilled at Site U1437 were analyzed using a JEOL SEM and AzTEC software with the goal of determining whether there is a relationship between shard chemistry and morphology. From collected data, I found that both medium K and low K shards are found in all intervals studied. I determined that there is no apparent relationship between shard chemistry (low-K versus med-K) and shard morphology. I also determined that there is no apparent relationship between shard chemistry and shard vesicularity. This could mean that morphology is not representative of eruptive environment or it could mean that the shards of low-K and med-K composition erupted in the same type of environment (subaerial) indicating that the abundance of med-K shards in muds deposited over the last million years are sourced from the SW Japan arc and not from the rear-arc of the Izu-Bonin system. Further analyses must be completed using trace elements via LAICPMS to fully determine the source of the medium-K shards.

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Appendix I:

Interval B1H2 60-63 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
3	0.5	12.4	78	0.2	0.9	2.35	0.43	0	2.2	100	A1	RGLK
2	0.44	12.4	78.6	0.2	1.1	2.4	0.49	0.1	2.27	100	A2	RGLK
2.5	0.51	12.5	78.1	0.2	1	2.4	0.44	0.1	2.15	100	A3	RGLK
2.4	0.32	12.2	80	0.2	0.8	1.98	0.31	0	1.82	100	AA1	RGLK
2.9	0.36	12.5	79.6	0.1	0.8	1.79	0.3	0.1	1.63	100	AA2	RGLK
2.8	0.35	12.3	79.6	0.1	0.9	1.93	0.33	0.1	1.57	100	AA3	RGLK
2.3	0.35	12.2	80	0.1	0.7	2.05	0.32	0.1	1.83	100	AA4	RGLK
1.1	0.29	12.6	79.8	0.2	2.2	1.63	0.32	0	1.96	100	AB1	RGMK
1	0.3	12.6	80.3	0.1	2.5	1.28	0.23	0	1.63	100	AB2	RGMK
1.1	0.27	12.6	80.3	0.2	2.3	1.4	0.23	0.1	1.56	100	AB3	RGMK
1.2	0.31	12.7	79.9	0.1	2.2	1.56	0.24	0.1	1.8	100	AB4	RGMK
3.2	0.92	13.2	72.8	0.3	0.9	3.48	0.57	0.2	4.45	100	AC1	RGLK
3	0.79	13.2	72.7	0.3	0.8	3.61	0.66	0.2	4.63	100	AC2	RGLK
3.5	0.88	13.4	72.4	0.3	0.8	3.34	0.72	0.2	4.46	100	AC3	RGLK
2.6	0.56	12.8	76.6	0.3	1.3	2.54	0.44	0.1	2.74	100	AD1	RGMK
3.2	0.57	12.6	76.9	0.4	1.1	2.32	0.41	0	2.5	100	AD2	RGLK
3.1	0.62	12.8	76.6	0.1	1.1	2.48	0.55	0	2.61	100	AD3	RGMK
2.4	0.55	12.4	77.3	0.2	1.1	2.75	0.46	0.1	2.8	100	AD4	RGMK
3.1	0.66	12.8	76.4	0.3	0.9	2.65	0.48	0.1	2.67	100	B1	RGLK
2.5	0.64	12.8	76.8	0.2	1	2.68	0.52	0.2	2.81	100	B2	RGLK
2.6	0.63	13	76.6	0.2	1	2.69	0.4	0.2	2.69	100	B3	RGLK
2.9	0.61	12.7	76.6	0.2	0.9	2.77	0.4	0.1	2.85	100	B4	RGLK
3.1	0.72	12.9	76.7	0.3	0.9	2.48	0.48	0	2.44	100	B5	RGLK
3.1	0.71	14	71.5	0.2	0.7	3.9	0.69	0.2	4.93	100	C1	RGLK
3	0.88	13.6	71.6	0.3	0.8	3.82	0.78	0.2	5.02	100	C2	RGLK
3.3	0.72	14	71.9	0.3	0.8	3.67	0.51	0	4.83	100	C3	RGLK
2.8	0.37	12.8	79.1	0.1	0.8	1.98	0.33	0.1	1.64	100	D1	RGLK
3	0.39	12.7	79	0.2	0.7	1.97	0.31	0	1.73	100	D2	RGLK
3.1	0.42	12.6	78.9	0.1	0.8	1.97	0.35	0.2	1.73	100	D3	RGLK
2.6	0.23	12.4	78.8	0.3	1.5	1.92	0.25	0	1.99	100	E1	RGMK
2.8	0.28	12.5	78.7	0.2	1.6	1.91	0.17	0.1	1.84	100	E2	RGMK
2.4	0.3	12.2	78.9	0.2	1.6	2.03	0.2	0.2	2.04	100	E3	RGMK
2.7	0.25	12.4	78.7	0.2	1.5	2.04	0.18	0.1	1.95	100	E4	RGMK
3	0.28	12.5	78.6	0.2	1.5	1.81	0.13	0	1.9	100	F1	RGMK
2.7	0.27	12.3	79.1	0.2	1.6	2.02	0.15	0	1.7	100	F2	RGMK
2.6	0.24	12.5	78.8	0.2	1.6	1.96	0.21	0	1.94	100	F3	RGMK
2.6	0.28	12.3	80.5	0	0.8	1.78	0.21	0.1	1.5	100	G1	RGLK
2.6	0.21	12.4	80.2	0.2	0.7	1.67	0.19	0.1	1.65	100	G2	RGLK
2.8	0.23	12.4	80.1	0.1	0.7	1.77	0.19	0	1.68	100	G3	RGLK
2.7	0.25	12.2	80.2	0.1	0.8	1.61	0.31	0.2	1.66	100	G4	RGLK

2.5	0.52	12	76.8	0.3	2.5	1.84	0.62	0.1	2.85	100	H1	RGMK
2.7	0.49	12.1	76.7	0.1	2.6	1.71	0.65	0.1	2.94	100	H2	RGMK
2.3	0.51	12.7	75.4	0.2	2.4	2.46	0.76	0.1	3.12	100	H3	RGMK
2.6	0.57	12.4	76	0.2	0.7	2.96	0.49	0.1	4.02	100	I1	RGLK
2.6	0.6	12.4	75.8	0.2	0.6	2.96	0.56	0.2	4.05	100	I2	RGLK
2.7	0.52	12.3	76.4	0.1	0.6	2.77	0.45	0.3	3.85	100	I3	RGLK
2.7	0.24	12.3	79.2	0.1	1.6	1.82	0.16	0.1	1.74	100	J1	RGMK
2.9	0.26	12.5	78.6	0.2	1.6	1.87	0.13	0.1	1.88	100	J2	RGMK
2.6	0.25	12.1	79.5	0.2	1.6	1.75	0.14	0.1	1.81	100	J3	RGMK
2.2	0.65	12.7	77.2	0.2	0.7	2.85	0.48	0.1	3.05	100	K1	RGLK
2.7	0.59	13	76.7	0.2	0.7	2.73	0.41	0.2	2.89	100	K2	RGLK
2.7	0.69	13.1	76.4	0.2	0.7	2.74	0.56	0.2	2.86	100	K3	RGLK
2.3	0.64	12.9	76.8	0.1	0.8	2.75	0.45	0.3	2.89	100	K4	RGLK
2.6	0.18	12.4	78.5	0.2	1.7	2.03	0.23	0.1	2.11	100	L1	RGMK
2.9	0.22	12.6	78.4	0.1	1.6	2.07	0.18	0	1.89	100	L2	RGMK
2.9	0.24	12.8	78.2	0.1	1.6	1.93	0.24	0.1	1.98	100	L3	RGMK
2.8	0.28	12.5	78.5	0.1	1.6	2.01	0.19	0.1	2.04	100	L4	RGMK
2.7	0.55	12.8	76	0.2	0.9	2.84	0.54	0.1	3.3	100	M1	RGLK
2.9	0.68	13	75.7	0.2	0.8	2.94	0.61	0.1	3.16	100	M2	RGLK
2.9	0.56	13	75.9	0.3	0.9	2.76	0.5	0.2	3.08	100	M3	RGLK
3.1	0.61	13	75.5	0.2	0.9	3	0.57	0.2	2.95	100	M4	RGLK
3.3	0.36	12.7	78.5	0.2	0.8	2.03	0.29	0.1	1.76	100	N1	RGLK
3	0.4	12.8	78.9	0.2	0.8	2.03	0.22	0	1.68	100	N2	RGLK
3.2	0.33	12.7	78.8	0.1	0.8	2.07	0.26	0	1.67	100	N3	RGLK
2.9	0.57	12.7	76.4	0.3	0.9	2.63	0.57	0	3.05	100	O1	RGLK
2.9	0.58	12.9	76.5	0.2	0.9	2.65	0.5	0.1	2.89	100	O2	RGLK
2.7	0.57	12.7	76.7	0.1	1	2.8	0.47	0.1	2.96	100	O3	RGLK
1.7	0.08	33.6	47.4	0	0	16.4	0.01	0.1	0.74	100	P1	Plag
1.6	0.09	33.5	47.4	0.2	0	16.5	0.1	0	0.7	100	P2	Plag
1.6	0.19	33.7	47.5	0.2	0	16.1	0	0	0.73	100	P3	Plag
3.1	0.88	13.6	72.3	0.2	0.9	3.71	0.59	0.1	4.65	100	Q1	RGLK
3.1	0.87	13.6	72.5	0.3	0.8	3.53	0.63	0.1	4.6	100	Q2	RGLK
3.3	0.84	13.8	72	0.4	0.9	3.62	0.7	0.1	4.39	100	Q3	RGLK
2.9	0.45	12.3	77.9	0.2	0.9	2.37	0.4	0.1	2.55	100	R1	RGLK
2.9	0.47	12.2	77.9	0.1	0.9	2.32	0.53	0.1	2.52	100	R2	RGLK
3	0.57	12.3	78	0.2	1	2.29	0.45	0.1	2.15	100	R3	RGLK
2.6	0.21	12.3	78.9	0.1	1.6	1.94	0.25	0.1	1.94	100	S1	RGMK
2.2	0.21	11.8	80.1	0	1.7	1.87	0.21	0	1.98	100	S2	RGMK
2.7	0.24	11.8	79.8	0	1.5	1.79	0.17	0.1	1.92	100	S3	RGMK
2.4	0.22	11.9	79.6	0.2	1.6	2	0.22	0.1	1.92	100	S4	RGMK
3.1	0.31	12.3	79.4	0.3	0.8	1.85	0.15	0.1	1.65	100	T1	RGLK
3.6	0.37	12.1	79.8	0.1	0.8	1.68	0.19	0.1	1.33	100	T2	RGLK
2.7	0.32	11.8	80.2	0.1	0.8	1.91	0.27	0	1.83	100	T3	RGLK
2.8	0.35	12	80.3	0.1	0.8	1.82	0.2	0	1.69	100	T4	RGLK
3	1.24	14.1	69	0.4	0.7	4.74	0.64	0.2	6.11	100	U1	DGLK

3	1.25	14.1	69.1	0.2	0.7	4.46	0.76	0.2	6.17	100	U2	DGLK
3.1	1.32	14.2	68.8	0.4	0.7	4.54	0.72	0.3	6.01	100	U3	DGLK
2.7	0.47	12.2	78.4	0.2	1	2.19	0.48	0	2.31	100	V1	RGLK
2.6	0.52	12	78.6	0.3	1	2.31	0.36	0.1	2.27	100	V2	RGLK
2.7	0.51	12.2	78.3	0.2	0.9	2.3	0.47	0	2.24	100	V3	RGLK
2.3	0.56	12	78.1	0.1	0.8	2.36	0.51	0.1	3.06	100	W1	RGLK
2.4	0.48	12	78.2	0.2	0.9	2.42	0.52	0.2	2.78	100	W2	RGLK
2.6	0.57	12.4	77.7	0.3	0.9	2.33	0.51	0	2.7	100	W3	RGLK
2.5	0.51	12.2	77.9	0.4	0.9	2.36	0.44	0.1	2.7	100	W4	RGLK
3.1	1.06	13.7	69.1	0.3	0.6	4.97	0.9	0.2	6.1	100	X1	RGLK
2.6	1.11	12.5	70.8	0.4	0.6	4.4	0.93	0.2	6.39	100	X2	RGLK
3	1.02	12.7	71.5	0.3	0.7	3.97	0.9	0.2	5.86	100	X3	RGLK
3.6	0.25	17.8	66.9	0.2	0.5	6.68	0.6	0.1	3.29	100	Y1	Pyroxene + Plag
3.8	0.21	21.1	63.4	0.1	0.3	8.05	0.48	0.1	2.49	100	Y2	Pyroxene + Plag
2.8	0.36	11.3	74.5	0.3	0.8	3.23	1.1	0.2	5.29	100	Y3	RGLK
0.8	14.8	4.7	53.6	0.1	0.1	6.08	0.58	0.8	18.5	100	Y4	Pyroxene + Plag
2.6	0.6	13.1	74.2	0.2	0.8	3.31	0.55	0.1	4.45	100	Z1	RGLK
3	0.7	13.3	73.8	0.2	0.9	3.14	0.5	0.2	4.34	100	Z2	RGLK
2.6	0.66	13.2	73.7	0.2	0.7	3.43	0.59	0.1	4.84	100	Z3	RGLK
Interval B2H5 123-126 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
3.1	0.49	13.5	76.9	0	0.7	2.74	0.38	0	2.16	100	A	RGLK
2.9	0.52	13.2	77.1	0.2	0.8	2.78	0.28	0	2.2	100	A	RGLK
3	0.5	13.4	77.1	0	0.8	2.72	0.42	0.1	2.09	100	A	RGLK
2.9	0.58	13.3	76.7	0.3	0.8	2.67	0.47	0.1	2.31	100	A	RGLK
2.5	0.5	13.1	77.1	0.1	0.8	2.82	0.5	0.2	2.32	100	A	RLGK
3.5	1.73	15.2	65.8	0.1	0.8	5.42	0.98	0.2	6.35	100	AA	DGLK
3.4	1.76	15.4	65.8	0.3	0.8	5.29	0.85	0.3	6.12	100	AA	DGLK
3.6	1.7	15.2	65.3	0.1	0.9	5.6	1.07	0.1	6.31	100	AA	DGLK
3.6	0.08	12.7	79.6	0.2	1	1.09	0.08	0.2	1.48	100	AB	RGLK
3.6	0.13	12.4	79.7	0.2	1	1.26	0	0.1	1.68	100	AB	RGLK
3.5	0.15	12.4	79.7	0	1.1	1.17	0.27	0	1.79	100	AB	RGLK
3.9	0.87	15.9	68.7	0.4	0.7	4.53	0.77	0.1	4.28	100	AC	DGLK
3.7	1.06	14.5	68.1	0.4	0.9	4.18	1.12	0.1	5.91	100	AC	DGLK
3.3	1.44	14.8	66.5	0.4	0.9	4.82	0.97	0.2	6.68	100	AC	DGLK
2.7	0.16	12.8	79.4	0	3.4	0.58	0.16	0.3	0.55	100	AD	RGMK
2.7	0.13	12.8	79	0.1	3.7	0.78	0.12	0.1	0.54	100	AD	RGMK
2.8	0.07	12.8	78.6	0.2	4	0.69	0.15	0.2	0.49	100	AD	RGMK
4.3	1.48	15.7	65.9	0.3	0.8	5.04	0.93	0.2	5.35	100	AE	DGLK
3.9	1.58	15.4	65.8	0.2	0.9	5.18	0.93	0.1	6.07	100	AE	DGLK
3.7	1.61	15.2	66.4	0.2	0.9	4.97	0.86	0.2	6.01	100	AE	DGLK

3.4	0.56	13.2	77.1	0.2	0.8	2.47	0.3	0.1	1.89	100	AF	RGLK
2.8	0.51	13.1	77.2	0.1	0.8	2.59	0.3	0.2	2.25	100	AF	RGLK
3.1	0.54	13.2	76.9	0.3	0.9	2.58	0.33	0.2	2.08	100	AF	RGLK
3.4	0.13	11.7	81.1	0	0.9	1.13	0.11	0	1.46	100	B	RGLK
3.1	0.11	11.8	81.2	0.1	0.9	1.2	0.19	0	1.43	100	B	RGLK
2.9	0.11	11.7	81.4	0	0.9	1.09	0.14	0	1.7	100	B	RGLK
3	0.15	12	80.9	0.2	1	1.2	0.13	0.1	1.46	100	B	RGLK
3.1	0.1	11.8	81.3	0	1	1.12	0.07	0.1	1.42	100	B	RGLK
3.2	1.32	15.7	66.4	0.1	0.8	5.47	0.86	0.1	6.07	100	C	DGLK
2.8	1.56	14.9	67.5	0.3	0.8	5.08	0.99	0.1	5.96	100	C	DGLK
3.1	1.48	15	68.2	0.2	0.8	4.59	0.81	0.2	5.7	100	C	DGLK
2.9	0.54	12.8	77.6	0.1	0.7	2.66	0.44	0.1	2.15	100	D	RGLK
2.8	0.57	12.9	77.7	0.2	0.7	2.62	0.37	0.1	2.08	100	D	RGLK
2.5	0.55	12.7	77.6	0.2	0.7	2.77	0.52	0.1	2.33	100	D	RGLK
3.2	1.67	15.3	66.2	0.1	0.8	5.12	0.97	0.2	6.53	100	E	DGLK
3.2	1.75	15.1	65.5	0.2	0.8	5.06	1.06	0.3	6.98	100	E	DGLK
3.3	1.81	15.3	65.3	0.2	0.8	5.4	1.03	0.2	6.75	100	E	DGLK
3.1	1.64	15.1	66	0.2	0.8	5.51	0.9	0.1	6.62	100	E	DGLK
2.8	0.51	12.7	78.2	0	0.7	2.43	0.38	0	2.24	100	F	RGLK
2.7	0.48	12.8	78.1	0.2	0.7	2.48	0.43	0.2	1.98	100	F	RGLK
2.8	0.46	12.9	78.2	0.1	0.8	2.4	0.35	0.1	2.03	100	F	RGLK
2.4	0.37	12.9	78	0.1	0.9	2.53	0.42	0.1	2.34	100	F	RGLK
3.5	0.1	12.5	80.3	0.1	1.1	1.01	0.12	0.1	1.3	100	G	RGMK
3.4	0.11	12.3	80.7	0	1.1	0.93	0.1	0.1	1.24	100	G	RGMK
3.3	0.06	12.5	80.5	0.2	1.1	0.9	0.12	0	1.4	100	G	RGMK
3.1	2.96	13.8	64.7	0.2	0.7	6.8	0.93	0.2	6.73	100	H	DGLK
3.5	1.59	15.3	66.1	0.2	0.9	5.24	0.91	0.2	6.2	100	H	DGLK
3.4	1.42	15.2	66.7	0.3	1	4.98	0.96	0.1	6.05	100	H	DGLK
0.1	19.2	1.11	52.4	0	0	5.02	0.23	0.8	21.3	100	I	OPX
0	22.8	0.78	53.9	0	0	5.13	0.12	0.5	16.8	100	I	OPX
0	20.9	1.38	52.7	0	0	6.02	0.2	0.6	18.2	100	I	OPX
3.9	1.82	15.4	65.4	0.3	0.8	5.24	0.83	0.2	6.24	100	J	DGLK
3.9	1.71	15.3	65.3	0.2	0.8	5.45	0.9	0.2	6.23	100	J	DGLK
3.6	1.83	15.4	65.1	0.2	0.8	5.63	0.9	0.2	6.32	100	J	DGLK
3.5	1.72	15.3	66.3	0.2	0.8	5.03	0.95	0.2	6.03	100	K	DGLK
4.4	1.74	15.3	65.7	0.3	0.8	4.98	0.81	0.2	5.83	100	K	DGLK
3.7	1.68	15.2	65.7	0.2	0.8	5.26	0.96	0.2	6.37	100	K	DGLK
3.4	1.94	15	65.9	0.3	0.9	5.2	0.91	0.2	6.28	100	K	DGLK
3.4	0.15	12.5	79.8	0.1	0.9	1.23	0.19	0.1	1.61	100	L	RGLK
3.2	0.14	12.7	79.8	0.1	1	1.28	0.12	0	1.63	100	L	RGLK
3.1	0.16	12.5	80.1	0.1	1.1	1.2	0.07	0	1.72	100	L	RGLK
3.2	0.1	12.6	79.8	0.1	1.1	1.26	0.15	0.1	1.68	100	L	RGLK
3.8	1.45	15.1	66.4	0.2	0.9	4.47	0.98	0.1	6.67	100	M	DGLK
3.7	1.54	15.2	66.5	0.2	0.9	4.86	0.99	0.2	5.96	100	M	DGLK
3.4	1.54	15.2	66.9	0.3	0.9	4.71	0.93	0.2	6.05	100	M	DGLK

4.2	1.39	16.3	66.6	0.3	0.7	5.13	0.72	0.1	4.65	100	N	DGLK
3.9	1.35	15	67	0.2	0.8	4.98	0.91	0.1	5.84	100	N	DGLK
3.2	1.51	14.7	66.7	0.1	1	4.99	0.93	0.2	6.65	100	N	DGLK
4.9	0.09	28.1	54.4	0	0.1	11.4	0.05	0	0.93	100	O	Plagioclase
3.8	1.62	14.2	66.9	0.3	0.9	4.84	0.99	0.2	6.35	100	O	DGLK
3.3	1.55	14.9	65.8	0.1	0.9	5.39	0.94	0.3	6.75	100	O	DGLK
3.5	1.53	14.7	66.6	0.4	1	5.07	1.03	0.2	6.02	100	Q	DGLK
3.6	1.29	14.6	65.8	0.3	1.1	4.9	1.04	0.1	7.4	100	Q	DGLK
3.3	1.33	14.8	66.2	0.2	1.1	4.93	1	0.2	6.92	100	Q	DGLK
4.2	1.68	15.3	65.4	0.3	0.8	5.04	0.98	0.2	6.12	100	R	DGLK
3.9	1.63	15.3	65.5	0.2	0.8	5.3	0.89	0.1	6.41	100	R	DGLK
3.8	1.45	15.4	66.3	0.2	0.9	5.01	0.86	0.1	6.09	100	R	DGLK
2.9	0.5	13.3	76.7	0.2	0.9	2.58	0.35	0.2	2.34	100	S	RGLK
3.2	0.58	13.3	76.8	0.1	0.9	2.64	0.45	0.1	2.11	100	S	RGLK
2.8	0.45	13.1	76.8	0.2	0.9	2.75	0.44	0.2	2.33	100	S	RGLK
3.2	0.05	12.2	81	0	1.1	0.9	0.16	0.1	1.32	100	T	RGLK
3	0.06	12.3	80.8	0.1	1.1	0.97	0.09	0.1	1.46	100	T	RGLK
3.2	0.09	12.3	81.2	0	1.1	0.83	0	0	1.2	100	T	RGLK
3	1.61	15.1	66.2	0.2	0.8	5.41	0.93	0.1	6.74	100	U	RGLK
3.2	1.58	15.1	66.7	0.4	0.8	5.09	0.91	0.2	6.23	100	U	RGLK
2.9	1.65	15.3	66.5	0.2	0.8	5.21	0.9	0.2	6.4	100	U	RGLK
3.8	0.11	28.6	54.9	0.1	0	11.6	0.04	0	0.83	100	V	Plagioclase
3.9	0.09	28.5	54.7	0	0	11.8	0.06	0.1	0.84	100	V	Plagioclase
3	1.57	14.3	66.9	0.2	0.7	5.25	0.97	0.2	6.96	100	V	DGLK
3.9	1.91	15.6	66	0.3	0.7	4.86	0.84	0.2	5.87	100	W	DGLK
2.9	1.77	15.4	65.6	0.2	0.8	5.29	1.11	0.2	6.76	100	W	DGLK
3.3	1.83	15.3	65.6	0.2	0.8	5.2	0.97	0.2	6.63	100	W	DGLK
2.9	1.74	15	65.8	0.2	0.9	5.5	0.93	0.2	6.76	100	W	DGLK
3.5	1.26	18.7	63.5	0.2	0.5	6.51	0.7	0.1	5.11	100	X	DGLK
3.1	1.37	15.4	67.5	0.2	0.7	5.01	0.85	0.1	5.82	100	X	DGLK
3.6	1.52	16.3	65.3	0.2	0.7	5.4	0.84	0.2	6.01	100	X	DGLK
2.7	1.59	14.7	66.7	0.2	1	5.12	0.97	0.2	6.95	100	X	DGLK
3.5	0.13	12.1	80.5	0.1	1.1	1.07	0.06	0.2	1.23	100	Y	RGMK
3.5	0.11	12.3	80.1	0.1	1.2	0.98	0.13	0.2	1.43	100	Y	RGMK
3.4	0.12	12.1	80.6	0.1	1.2	0.91	0.09	0	1.44	100	Y	RGMK
3.6	0.09	12.2	80.4	0.1	1	1.05	0.17	0	1.41	100	Z	RGMK
3.9	0.12	12.3	80.2	0	1.1	0.94	0.11	0	1.27	100	Z	RGMK
3.6	0.1	12.4	80.1	0.1	1.1	0.98	0.23	0.1	1.24	100	Z	RGMK
Interval B2H5 123-126 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
5.1	0.05	27.3	56.3	0	0	10.2	0.04	0	0.98	100	A	Plag
2.6	0.68	12.5	74.4	0.3	0.7	3.32	0.45	0.2	4.88	100	A	RGLK
2.6	0.64	12.2	74.9	0.2	0.7	3.21	0.55	0.2	4.81	100	A	RGLK
3.1	0.01	12.6	80	0.2	1.1	1.2	0.19	0.1	1.6	100	AA	RGLK

3.3	0.06	12.5	80.2	0.2	1.1	1.14	0.11	0.1	1.43	100	AA	RGLK
3.3	0.07	12.6	80.2	0.1	1.1	1.1	0.08	0.1	1.51	100	AA	RGMK
3.1	1.5	15.2	66.2	0.2	0.8	5.5	0.88	0.2	6.41	100	AB	DGLK
3.1	1.69	15.1	66.2	0.4	0.8	5.17	0.86	0.1	6.71	100	AB	DGLK
3	1.63	14.9	67.1	0.3	0.9	4.83	0.91	0.2	6.22	100	AB	DGLK
0.2	15.3	2.47	51.6	0	0	17.4	0.65	0.6	11.9	100	AC	CPX
4.5	0.17	28	54.6	0.1	0.1	11.7	0	0	0.91	100	AC	PLAG
3.1	1.41	15.1	67.2	0.2	0.9	4.95	0.9	0.2	6.19	100	AC	DGLK
3.6	1.36	15.6	66.8	0.2	0.9	5.13	0.86	0.1	5.54	100	AD	DGLK
3.1	1.61	14.8	66.3	0.4	0.9	5.35	0.92	0.2	6.59	100	AD	DGLK
3.3	0.1	12.5	80.4	0.2	1.1	0.98	0.13	0.1	1.26	100	B	RGMK
3.4	0.14	12.4	80.5	0.2	1.2	0.92	0.03	0.1	1.18	100	B	RGMK
3.2	0.09	12.3	80.6	0.2	1.2	0.99	0.01	0.1	1.3	100	B	RGMK
3.3	0.14	12.4	80.2	0.2	1.1	1.03	0.12	0.1	1.4	100	C	RGLK
3.3	0.04	12.5	80.5	0.1	1.1	1.11	0.07	0.1	1.26	100	C	RGLK
3.2	0.04	12.7	80.2	0.1	1.1	1.03	0.02	0.1	1.46	100	C	RGMK
3.3	0.11	12.4	80.3	0.1	1.1	0.95	0.12	0.2	1.36	100	D	RGMK
3.2	0.16	12.3	80.6	0.2	1.1	0.92	0.13	0.1	1.3	100	D	RGMK
3.2	0.03	12.3	80.1	0.3	1.3	1.09	0.15	0.1	1.41	100	D	RGMK
3.4	0.09	12.5	80	0	1	1.13	0.17	0.2	1.6	100	E	RGLK
3.3	0.09	12.4	80.1	0.3	1.1	1.12	0.13	0.1	1.4	100	E	RGLK
3.3	0.07	12.5	80	0.1	1.1	1.15	0.13	0.1	1.51	100	E	RGMK
3.1	1.62	15.2	66	0.3	0.8	5.13	0.99	0.3	6.58	100	F	DGLK
3.4	1.52	15.3	66.4	0.2	0.9	5.14	0.89	0.3	6.01	100	F	DGLK
3.2	1.69	15	65.9	0.2	0.9	5.36	0.85	0.3	6.62	100	F	DGLK
3.3	1.71	15.2	65.9	0.2	0.8	5.33	0.91	0.2	6.49	100	G	DGLK
3.2	1.74	15.3	65.8	0.3	0.8	5.31	0.93	0.2	6.5	100	G	DGLK
3.2	1.6	15.1	66.2	0.2	0.9	5.47	0.89	0.3	6.25	100	G	DGLK
3.3	1.7	15.2	66.1	0.2	0.8	5.37	0.84	0.1	6.45	100	H	DGLK
3	1.49	15.5	67.8	0.3	0.9	4.75	0.85	0.2	5.15	100	H	DGLK
3.2	1.79	15.2	65.8	0.3	0.9	5.32	0.87	0.2	6.45	100	H	DGLK
3.1	1.52	15.8	66	0.3	0.8	5.43	0.92	0.1	6.13	100	I	DGLK
3.1	1.67	15.2	66	0.3	0.8	5.39	0.82	0.2	6.66	100	I	DGLK
3.1	1.72	15.2	65.9	0.2	0.9	5.15	0.94	0.3	6.58	100	I	DGLK
3.4	0.23	13.2	78	0.2	0.8	1.79	0.22	0.1	2.1	100	J	RGLK
3.3	0.17	13.5	77.8	0.1	0.8	1.77	0.23	0.3	2.07	100	J	RGLK
3.2	0.22	13.4	77.9	0.1	0.9	1.86	0.25	0.1	2.12	100	J	RGLK
3.2	1.67	15.4	65.9	0.2	0.8	5.33	0.97	0.2	6.44	100	K	DGLK
3.1	1.72	15.4	66.2	0.2	0.8	5.39	0.85	0.1	6.32	100	K	DGLK
3.4	1.49	15.3	66.4	0.2	0.9	5.14	0.92	0.1	6.25	100	K	DGLK
3.4	1.66	15.2	65.7	0.3	0.8	5.46	0.95	0.2	6.35	100	L	DGLK
3.5	1.76	15.3	65.5	0.2	0.9	5.35	0.9	0.2	6.5	100	L	DGLK
3.2	1.7	15.2	65.6	0.2	0.9	5.57	0.88	0.1	6.62	100	L	DGLK
3.4	0.08	12.4	80.1	0.2	1.2	0.98	0.09	0.1	1.51	100	M	RGMK
3.3	0.13	12.3	80.4	0.1	1.2	1	0.11	0.1	1.48	100	M	RGMK

3.3	0.02	12.4	80.5	0.1	1.2	0.99	0.15	0	1.35	100	M	RGMK
3.2	1.46	15	66.9	0.3	0.8	5.2	0.76	0	6.24	100	N	DGLK
3.3	1.66	15	66.5	0.3	0.9	5.09	0.92	0.2	6.2	100	N	DGLK
3.2	1.53	15.1	66.8	0.3	0.9	5.18	0.9	0.1	6.04	100	N	DGLK
3.5	1.76	15.4	65.1	0.3	0.8	5.64	0.85	0.2	6.52	100	O	DGLK
3.1	1.72	15.3	65.6	0.3	0.8	5.59	0.92	0.1	6.51	100	O	DGLK
3.3	1.65	15.3	66	0.3	0.8	5.23	0.97	0.2	6.25	100	O	DGLK
3.2	0.07	12.6	80	0.1	1	1.2	0.15	0.2	1.59	100	P	RGLK
3.3	0.15	12.4	80.2	0.1	1.1	1.17	0.07	0	1.45	100	P	RGLK
3.3	0.15	12.4	79.9	0.2	1.1	1.12	0.1	0.2	1.6	100	P	RGLK
3.1	0.57	13.8	74.2	0.3	1.9	2.59	0.81	0.2	2.53	100	Q	RGMK
2.8	0.45	13	75.5	0.2	2.1	2.34	0.81	0	2.83	100	Q	RGMK
3.1	0.54	13.2	75	0.2	2.1	2.18	0.68	0.2	2.81	100	Q	RGMK
4	0.07	29.1	53.8	0.1	0	12.2	0.04	0	0.76	100	R	Plag
4.3	0.17	28.6	54.4	0	0.1	11.5	0.01	0	0.96	100	R	Plag
3.3	1.51	14.5	66.8	0.4	0.9	5	1.06	0.3	6.38	100	R	DGLK
3.3	0.1	12.4	80.3	0	1.1	1.04	0.13	0.1	1.53	100	S	RGMK
3.3	0.13	12.4	80.1	0.2	1.2	1.08	0.22	0.1	1.45	100	S	RGMK
3.2	0.12	12.3	80.4	0.2	1.2	1.09	0.1	0	1.48	100	S	RGMK
3.2	0.12	12.5	79.8	0.2	1	1.17	0.13	0.2	1.71	100	T	RGMK
3.2	0.09	12.5	79.9	0.2	1.1	1.24	0.14	0.1	1.61	100	T	RGLK
3.2	0.14	12.2	80	0.2	1.1	1.21	0.24	0.1	1.61	100	T	RGMK
3	1.63	15	66.8	0.3	0.7	5.1	0.98	0.2	6.17	100	U	DGLK
3.1	1.58	15	66.2	0.3	0.9	5.35	0.94	0.3	6.33	100	U	DGLK
3.1	1.52	15.1	66.6	0.2	0.9	5.14	1	0.2	6.28	100	U	DGLK
3.2	1.64	15.1	66.6	0.2	0.8	5.23	0.83	0.2	6.16	100	V	DGLK
3.1	1.44	15.1	66.9	0.2	0.8	4.97	1	0	6.39	100	V	DGLK
3.2	1.6	15.2	66.6	0.3	0.9	5.21	0.91	0.1	6.03	100	V	DGLK
3	1.52	15.2	67.3	0.3	0.9	4.93	0.83	0.3	5.98	100	W	DGLK
3	1.54	14.8	67.1	0.3	0.9	5.02	0.94	0.2	6.15	100	W	DGLK
3.2	1.51	15.1	66.9	0.4	1	4.94	0.91	0	6.15	100	W	DGLK
3.2	0.15	12.4	80	0.2	1	1.17	0.17	0.1	1.67	100	X	RGLK
3.2	0.12	12.5	79.9	0.2	1	1.19	0.18	0.2	1.64	100	X	RGLK
3.2	0.08	12.5	80	0.1	1.1	1.21	0.11	0.1	1.56	100	X	RGMK
3.1	1.75	15.3	65.7	0.2	0.8	5.29	0.92	0.2	6.88	100	Y	DGLK
2.9	1.62	15.5	66.4	0.4	0.8	5.23	0.82	0.1	6.22	100	Y	DGLK
3.2	1.81	15.3	65.4	0.1	0.9	5.55	0.97	0.3	6.59	100	Y	DGLK
3.2	1.64	15.2	66.9	0.2	0.8	5.05	0.85	0.1	6.04	100	Z	DGLK
3.5	1.43	15.4	67.4	0.3	0.8	4.9	0.87	0.1	5.32	100	Z	DGLK
3.3	1.51	15	66.8	0.2	0.9	4.91	0.97	0.2	6.29	100	Z	DGLK
Interval B2H5 139-142 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
2.5	0.12	12.6	81	0.1	1	1.11	0.09	0.1	1.43	100	A	RGLK
2.6	0.06	12.5	80.9	0.1	1	1.12	0.15	0.1	1.5	100	A	RGLK
2.5	0.06	12.7	80.7	0.1	1.1	1.17	0.15	0.1	1.49	100	A	RGLK

3.2	0.07	12.6	79.8	0.2	1	1.28	0.13	0.1	1.64	100	AA	RGLK
3	0.11	12.4	80.5	0	1	1.25	0.03	0.1	1.61	100	AA	RGLK
3.2	0.11	12.6	80.1	0	1	1.12	0.23	0.1	1.6	100	AA	RGLK
2.8	0.3	12.5	79.9	0.1	0.7	1.98	0.14	0	1.65	100	AB	RGLK
2.7	0.31	12.3	79.5	0.1	0.9	2	0.28	0.2	1.84	100	AB	RGLK
2.8	0.22	12.5	79.6	0.2	1.1	1.78	0.27	0	1.61	100	AB	RGLK
2.8	0.67	13	74.3	0.2	0.5	3.48	0.6	0.2	4.39	100	AD	RGLK
2.9	0.69	12.9	74.4	0.3	0.5	3.38	0.55	0.1	4.36	100	AD	RGLK
2.8	0.69	13	74.5	0.3	0.5	3.22	0.57	0.2	4.37	100	AD	RGLK
3.2	0.13	12.4	80.2	0.2	1	1.09	0.2	0.1	1.51	100	AE	RGLK
3.2	0.03	12.4	80.4	0.1	1.1	1.07	0.14	0.1	1.5	100	AE	RGLK
3.2	0.09	12.4	80.1	0.1	1.2	1.08	0.16	0.1	1.6	100	AE	RGMK
3	0.13	12.5	80.3	0	1	1.2	0.23	0	1.53	100	B	RGLK
2.9	0.09	12.5	80.5	0.1	1.1	1.12	0.16	0.1	1.57	100	B	RGLK
3	0.07	12.3	80.3	0.3	1.2	1.1	0.13	0.1	1.55	100	B	RGMK
3.4	0.04	12.4	80	0.3	1.3	1	0.17	0.1	1.39	100	C	RGMK
3.5	0.05	12.5	79.9	0.3	1.3	1.01	0.02	0.1	1.53	100	C	RGMK
3.4	0.15	12.4	80	0.2	1.3	0.94	0.13	0	1.43	100	C	RGMK
3.3	0.09	12.4	80	0.3	1.1	1.04	0.17	0.1	1.6	100	D	RGLK
3.3	0.17	12.5	79.8	0.1	1.1	1.14	0.23	0.2	1.47	100	D	RGLK
3.3	0.09	12.5	79.7	0.1	1.3	1.1	0.17	0.2	1.65	100	D	RGMK
3.5	0.09	12.3	80	0.2	1.2	1.02	0.12	0	1.5	100	E	RGMK
3.5	0.1	12.4	79.9	0	1.3	1.01	0.08	0.1	1.66	100	E	RGMK
3.5	0.06	12.6	79.9	0.2	1.3	1.03	0.05	0.1	1.35	100	E	RGMK
3.1	0.5	12.6	75.9	0.3	0.5	2.96	0.53	0.1	3.6	100	F	RGLK
3	0.59	12.7	75.8	0.2	0.5	2.96	0.57	0.1	3.59	100	F	RGLK
3.2	0.49	12.8	75.9	0.3	0.5	2.93	0.51	0.2	3.34	100	F	RGLK
3.4	0.04	12.5	79.9	0.3	1.2	1.11	0.08	0.1	1.4	100	G	RGMK
3.5	0.07	12.6	79.7	0.1	1.3	1.03	0.15	0.1	1.56	100	G	RGMK
3.5	0.09	12.5	79.8	0.1	1.4	1.04	0.15	0.1	1.38	100	G	RGMK
3.5	0.07	12.4	79.9	0.1	1.2	1.17	0.1	0.1	1.38	100	H	RGMK
3.6	0.1	12.5	79.7	0.2	1.3	1.07	0.09	0.1	1.42	100	H	RGMK
3.4	0.13	12.6	79.7	0.2	1.3	1.02	0.1	0.1	1.49	100	H	RGMK
3.4	0	12.5	79.9	0.1	1.2	1.07	0.16	0.1	1.44	100	I	RGMK
3.6	0.08	12.4	79.7	0.1	1.3	1.17	0.13	0.2	1.46	100	I	RGMK
3.2	0.13	12.2	80.1	0.2	1.4	0.99	0.15	0.2	1.37	100	I	RGMK
3.7	0.09	12.4	79.7	0.2	1.3	1.01	0.14	0.1	1.35	100	J	RGMK
3.5	0.07	12.4	80	0.1	1.4	1.07	0.01	0.1	1.23	100	J	RGMK
3.6	0.05	12.6	79.8	0.1	1.4	0.94	0.11	0.1	1.29	100	J	RGMK
3.4	0.12	12.5	80.1	0.1	1.2	1.11	0.06	0.1	1.28	100	L	RGMK
3.4	0.09	12.4	80	0.1	1.2	1.1	0.11	0.1	1.44	100	L	RGMK
3.3	0.02	12.4	80.2	0.1	1.3	1.19	0.17	0.1	1.35	100	L	RGMK
3.2	0.09	12.4	80.2	0.3	1.2	1.07	0.09	0.2	1.32	100	M	RGMK
3.2	0.06	12.6	80	0.2	1.2	1.09	0.09	0.2	1.47	100	M	RGMK
3.1	0.06	12.4	80.4	0.2	1.2	1.11	0.16	0	1.31	100	M	RGMK

3.3	0.07	12.4	80.1	0.2	1.2	1.09	0.11	0.1	1.46	100	N	RGMK
3.4	0.04	12.7	80	0.1	1.2	1.03	0.06	0	1.33	100	N	RGMK
3.3	0.12	12.4	80	0.2	1.3	1.04	0.14	0.1	1.49	100	N	RGMK
3.3	0.07	12.6	80.1	0.2	1.2	0.97	0.09	0.1	1.33	100	O	RGMK
3.3	0.05	12.7	80.1	0	1.2	0.96	0.11	0.1	1.44	100	O	RGMK
3.5	0.04	12.5	80.2	0.1	1.3	1.02	0.09	0.2	1.2	100	O	RGMK
3.4	0.06	12.6	80	0.2	1.2	1.1	0.09	0.1	1.37	100	P	RGMK
3.6	0.03	12.5	79.9	0.1	1.2	1.03	0.08	0.2	1.46	100	P	RGMK
3.4	0.08	12.4	80	0	1.3	1.08	0.11	0	1.59	100	P	RGMK
3.1	0.15	11.7	80.3	0.2	1	1.51	0.36	0	1.74	100	Q	RGLK
3	0.21	11.8	80.4	0.1	1	1.56	0.27	0	1.69	100	Q	RGLK
2.9	0.17	11.6	80.3	0.2	1.1	1.64	0.28	0.1	1.76	100	Q	RGLK
3.5	0.07	12.5	80	0	1.2	1.16	0.11	0.1	1.38	100	R	RGMK
3.5	0.07	12.5	79.7	0.1	1.2	1.11	0.14	0.1	1.63	100	R	RGMK
3.5	0.13	12.5	79.8	0.1	1.2	1.09	0.11	0.1	1.5	100	R	RGMK
3.2	0.11	12.4	80	0.1	1.2	1.09	0.19	0.2	1.51	100	S	RGMK
3.3	0.09	12.4	79.9	0.2	1.2	1.21	0.16	0.1	1.56	100	S	RGMK
3.5	0.06	12.5	79.8	0.1	1.2	1.17	0.12	0.1	1.49	100	S	RGMK
3.5	0.11	12.4	80	0.2	1.3	1.09	0.09	0.1	1.34	100	T	RGMK
3.5	0.1	12.5	79.5	0.2	1.3	1.12	0.18	0.1	1.52	100	T	RGMK
3.4	0.07	12.6	79.7	0	1.3	1.08	0.2	0.1	1.54	100	T	RGMK
3.6	0.08	12.5	79.6	0.2	1.2	1.12	0.09	0.1	1.57	100	U	RGMK
3.5	0.07	12.5	80.1	0	1.3	1.05	0.14	0	1.33	100	U	RGMK
3.6	0.06	12.4	80	0	1.3	1.07	0.1	0.1	1.35	100	U	RGMK
3.3	0.06	12.5	79.9	0.1	1.2	1.09	0.15	0.1	1.65	100	V	RGMK
3.2	0.13	12.5	80.2	0.1	1.2	1.15	0.12	0.1	1.39	100	V	RGMK
3.1	0.1	12.7	80	0.1	1.3	1.12	0.08	0.2	1.34	100	V	RGMK
3.3	0.1	12.5	80.4	0.1	1.1	1.05	0.16	0	1.37	100	X	RGLK
3.2	0.11	12.3	80.6	0.1	1.1	1.03	0.18	0	1.43	100	X	RGMK
3.1	0.09	12.5	80.2	0.2	1.2	1.02	0.09	0	1.5	100	X	RGMK
3.1	0.08	12.4	80.6	0.1	1.2	1.05	0.06	0.1	1.43	100	Y	RGMK
3.2	0.09	12.4	80.6	0.2	1.2	0.99	0.08	0	1.21	100	Y	RGMK
3.2	0.13	12.5	80.5	0.2	1.2	1.05	0.07	0.1	1.26	100	Y	RGMK
2.7	0.86	13.4	73.1	0.3	0.4	3.66	0.66	0.2	4.72	100	Z	RGLK
2.6	0.79	13.1	73.6	0.3	0.4	3.55	0.74	0.2	4.63	100	Z	RGLK
2.7	0.81	13.1	73.2	0.2	0.5	3.72	0.72	0.3	4.83	100	Z	RGLK
Interval B2H6 11-14 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
3.4	0.32	13.9	73	0.2	1.9	2.59	0.39	0.1	4.29	100	A	RGMK
3.4	0.24	13.6	73.4	0	1.9	2.43	0.38	0.1	4.44	100	A	RGMK
3.5	0.25	13.7	72.8	0.3	2.1	2.49	0.38	0	4.47	100	A	RGMK
4.1	0.29	28.3	53.7	0.1	0.1	12.2	0.08	0	1.19	100	AA	Plag
3.2	2.5	15	62.4	0.2	0.4	6.8	0.84	0.3	8.36	100	AA	DGLK
3.4	2.2	15.1	64.1	0.3	0.4	6.11	0.95	0.2	7.21	100	AA	DGLK

3.2	0.31	12.7	78.3	0.3	0.9	2.09	0.34	0.1	1.89	100	AB	RGLK
3.4	0.29	12.7	78.5	0.1	0.9	2.06	0.3	0	1.78	100	AB	RGLK
3.3	0.35	12.6	78.3	0.1	0.9	2.15	0.26	0.2	1.8	100	AB	RGLK
3.4	0.32	12.5	78.5	0.2	0.9	2.09	0.3	0.1	1.68	100	AC	RGLK
3.4	0.28	12.4	78.7	0.2	0.9	2.04	0.31	0	1.8	100	AC	RGLK
3.5	0.29	12.6	78.6	0.2	0.9	1.96	0.22	0.1	1.74	100	AC	RGLK
3.8	0.33	12.3	78.8	0.3	0.9	1.92	0.27	0	1.49	100	AD	RGLK
3.1	0.17	12.7	79.2	0.3	0.9	1.73	0.21	0.1	1.61	100	AD	RGLK
2.8	0.29	11.8	80.2	0.4	1.1	1.49	0.27	0.1	1.57	100	AD	RGLK
3.2	0.3	12.9	78.5	0.1	0.8	2.03	0.31	0.1	1.78	100	B	RGLK
3.1	0.34	12.7	78.4	0.3	0.8	2.12	0.27	0.2	1.76	100	B	RGLK
3	0.32	12.8	78.3	0.2	1	2.2	0.23	0	1.82	100	B	RGLK
2.9	0.26	11.9	80.3	0.2	0.9	1.57	0.2	0.2	1.64	100	C	RGLK
3	0.24	11.7	80.5	0.4	0.9	1.63	0.25	0.1	1.46	100	C	RGLK
2.8	0.18	11.9	80.4	0.2	0.9	1.69	0.23	0.1	1.57	100	C	RGLK
2.9	0.28	12.5	79.2	0.3	0.7	2.09	0.27	0	1.69	100	D	RGLK
3.1	0.34	12.6	78.8	0.3	0.8	2.16	0.18	0.1	1.61	100	D	RGLK
3.2	0.3	12.7	79	0.2	0.8	1.99	0.22	0.1	1.44	100	D	RGLK
5.7	0	27.3	56.6	0.2	0.1	9.53	0	0.1	0.4	100	E	Plag
2.9	0.28	11.8	80.3	0.2	0.8	1.6	0.25	0.1	1.64	100	E	RGLK
2.6	0.25	11.6	80.7	0.2	0.9	1.65	0.28	0.2	1.63	100	E	RGLK
2.8	0.23	11.9	80.5	0.2	0.9	1.61	0.21	0.1	1.53	100	F	RGLK
2.6	0.33	11.7	80.7	0.3	0.9	1.56	0.3	0.1	1.57	100	F	RGLK
2.7	0.3	11.7	80.7	0.4	0.9	1.35	0.23	0	1.63	100	F	RGLK
3	0.2	11.8	80.2	0.2	0.9	1.57	0.2	0.1	1.78	100	G	RGLK
3.1	0.19	12.1	80	0.4	0.9	1.5	0.25	0	1.55	100	G	RGLK
3	0.29	11.7	80.2	0.3	0.9	1.59	0.24	0.1	1.69	100	G	RGLK
3.1	0.25	11.9	80.2	0.1	0.8	1.67	0.24	0	1.64	100	H	RGLK
3.1	0.29	11.8	80.4	0	0.9	1.65	0.28	0.1	1.58	100	H	RGLK
3	0.2	12	79.9	0.2	0.9	1.71	0.24	0.2	1.65	100	H	RGLK
3.2	0.41	13.7	72.6	0.2	1.8	2.68	0.46	0.2	4.8	100	I	RGMK
3.2	0.38	13.8	72.6	0.3	1.8	2.62	0.47	0.1	4.7	100	I	RGMK
3.1	0.34	13.9	72.8	0.3	1.9	2.61	0.34	0.1	4.69	100	I	RGMK
3	0.24	12	80.4	0	0.8	1.75	0.15	0	1.68	100	J	RGLK
3.1	0.3	11.9	79.7	0.3	0.9	1.75	0.3	0.2	1.68	100	J	RGLK
3	0.2	12.1	79.9	0.2	0.9	1.76	0.26	0.1	1.55	100	J	RGLK
3	0.31	11.9	80	0.2	0.8	1.74	0.22	0.2	1.64	100	K	RGLK
3	0.31	12.1	79.8	0.3	0.9	1.82	0.2	0.1	1.63	100	K	RGLK
3	0.24	12	80.2	0.2	0.9	1.74	0.16	0	1.59	100	K	RGLK
3.1	0.26	12.9	73.1	0.2	0.7	3.56	0.36	0.2	5.62	100	L	RGLK
3.2	0.28	12.8	73.5	0.1	0.7	3.41	0.31	0.2	5.59	100	L	RGLK
3.2	0.32	12.8	73.6	0.3	0.8	3.4	0.45	0.1	5.19	100	L	RGLK
3	0.25	12	80.2	0.1	0.9	1.69	0.2	0.1	1.55	100	M	RGLK
2.9	0.2	12	80.4	0.1	0.9	1.63	0.32	0	1.62	100	M	RGLK
2.9	0.26	11.9	80.3	0.4	0.9	1.58	0.15	0.1	1.51	100	M	RGLK

3.4	0.3	12.6	78.5	0.5	0.8	1.95	0.26	0.1	1.66	100	N	RGLK
3.2	0.38	12.7	78.6	0.3	0.8	2.08	0.28	0.1	1.63	100	N	RGLK
3.2	0.27	12.6	78.7	0.2	0.8	2.19	0.28	0.1	1.61	100	N	RGLK
3.1	0.22	12	79.9	0.1	0.8	1.91	0.32	0	1.59	100	O	RGLK
3	0.28	11.9	79.7	0.2	0.9	1.76	0.29	0.2	1.69	100	O	RGLK
3	0.23	11.9	80.1	0.3	0.9	1.7	0.21	0	1.56	100	O	RGLK
3.7	0.2	15.9	74.6	0.2	0.5	3.38	0.08	0.1	1.31	100	P	RGLK
3.1	0.16	11.8	80.3	0.2	0.8	1.71	0.24	0	1.63	100	P	RGLK
3	0.25	11.9	80.3	0.2	0.8	1.73	0.13	0	1.58	100	P	RGLK
6.7	0.03	25.2	60.2	0.1	0.1	7.38	0.04	0	0.34	100	Q	Plag
3	0.22	11.8	79.9	0.4	0.9	1.83	0.22	0.1	1.74	100	Q	RGLK
3	0.25	11.9	80.3	0.2	0.9	1.59	0.22	0.1	1.55	100	Q	RGLK
3	0.25	11.8	80.3	0.3	0.8	1.63	0.2	0.1	1.75	100	R	RGLK
2.9	0.15	11.9	80.3	0.3	0.8	1.64	0.23	0.1	1.72	100	R	RGLK
2.9	0.23	12	80.1	0.3	0.9	1.66	0.22	0.1	1.56	100	R	RGLK
3	0.85	13.1	72.7	0.4	0.5	3.89	0.72	0.2	4.69	100	S	RGLK
2.9	0.85	13.2	72.9	0.3	0.5	3.91	0.52	0.2	4.68	100	S	RGLK
2.9	0.81	13.1	73	0.4	0.5	3.77	0.63	0.1	4.77	100	S	RGLK
3	0.18	11.9	80.2	0.2	0.9	1.66	0.23	0.2	1.69	100	T	RGLK
2.9	0.26	12	80.5	0.1	0.9	1.57	0.24	0.1	1.47	100	T	RGLK
2.9	0.27	11.9	80.1	0.4	1	1.61	0.24	0.2	1.54	100	T	RGLK
3.3	0.31	13.7	73	0	1.8	2.7	0.39	0.2	4.62	100	U	RGMK
3.4	0.34	13.9	72.6	0.2	1.9	2.69	0.27	0.2	4.49	100	U	RGMK
3.2	0.35	13.7	72.8	0.3	1.9	2.65	0.39	0.2	4.51	100	U	RGMK
6.7	0	25.9	59.2	0.1	0.1	7.67	0.09	0.1	0.24	100	V	AGLK
3.2	0.29	12.1	79.8	0.2	1	1.61	0.23	0	1.49	100	V	RGLK
3.1	0.26	11.9	80	0.1	1	1.65	0.24	0.2	1.55	100	V	RGLK
3.2	0.32	12.6	78.7	0.2	0.8	2.07	0.13	0.1	1.77	100	W	RGLK
3.3	0.29	12.6	79.1	0	0.9	2.03	0.25	0	1.57	100	W	RGLK
3.3	0.32	12.8	78.5	0.1	0.9	2.05	0.24	0.1	1.66	100	W	RGLK
3.3	0.23	12.1	79.8	0.4	0.9	1.65	0.16	0.1	1.49	100	X	RGLK
3.3	0.29	12.2	79.6	0.2	0.9	1.75	0.22	0	1.66	100	X	RGLK
3.3	0.25	12	79.8	0.3	1	1.76	0.32	0	1.41	100	X	RGLK
3.2	0.28	12	79.8	0.2	0.9	1.73	0.23	0	1.62	100	Y	RGLK
3	0.24	12.1	79.7	0.4	0.9	1.58	0.31	0	1.75	100	Y	RGLK
Interval B2H6 45-48 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
2.9	1.87	14.2	64.7	0.2	0.5	6.14	0.95	0.2	8.41	100	A	DGLK
3	2.03	14.2	64.2	0.1	0.6	6.28	0.95	0.2	8.57	100	A	DGLK
3	1.88	14.1	64.6	0.1	0.6	6.04	1.05	0.2	8.38	100	A	DGLK
3.9	0.94	13.4	67.7	0.6	1.7	3.49	1.28	0.2	6.85	100	B	DGMK
4.2	0.91	14.7	66.2	0.4	1.7	3.93	1.11	0.3	6.56	100	B	DGMK
4.1	0.87	13.7	67.6	0.4	1.8	3.67	1.18	0.3	6.48	100	B	DGMK
2.7	2.07	13.9	63.7	0.2	0.5	6.49	0.94	0.3	9.33	100	C	DGLK

2.6	1.94	13.9	64.1	0.2	0.5	6.54	1.03	0.3	8.9	100	C	DGLK
2.7	1.9	14.1	64.2	0.3	0.6	6.36	0.93	0.4	8.66	100	C	DGLK
3.4	0.27	13.5	73.3	0.1	2.1	2.56	0.4	0.1	4.21	100	D	RGMK
3.5	0.25	13.6	73.3	0.1	2.2	2.37	0.31	0.1	4.3	100	D	RGMK
3.5	0.3	13.3	73.5	0.2	2.2	2.41	0.4	0.1	4.19	100	D	RGMK
3.1	0.34	13.3	76.5	0.1	2.7	1.57	0.46	0.1	1.82	100	E	RGMK
3	0.3	13.3	76.7	0.1	2.8	1.63	0.45	0.1	1.69	100	E	RGMK
3.1	0.38	13.3	76.6	0.1	2.8	1.67	0.43	0	1.65	100	E	RGMK
3.5	1.32	14.7	66.5	0.2	1.5	4.22	0.8	0.3	6.94	100	F	DGMK
3.4	1.21	14.4	67.2	0.3	1.6	4.09	0.92	0.1	6.8	100	F	DGMK
3.3	1.16	14.4	67.3	0.2	1.7	4.04	0.91	0.1	6.85	100	F	DGMK
2.6	1.89	13.8	64.4	0.4	0.5	6.22	1.04	0.3	8.86	100	G	DGLK
2.6	1.95	14.1	64.2	0.2	0.5	6.26	0.96	0.2	8.96	100	G	DGLK
2.8	1.88	14.2	64.4	0.2	0.5	6.32	0.89	0.1	8.76	100	G	DGLK
3	0.13	31.5	49.7	0.1	0	14.6	0	0	1.01	100	H	Plag
3.1	0.17	31	50.2	0.2	0	14.3	0.08	0	0.97	100	H	Plag
3.8	0.1	29.7	51.9	0	0.1	13.3	0.05	0	1.18	100	H	Plag
3.1	1.19	14.5	69.2	0.2	0.4	4.66	0.77	0.1	5.92	100	I	RGLK
2.8	0.96	13.3	72.4	0.3	0.5	3.79	0.64	0.2	5.11	100	I	RGLK
3	1.06	13.4	71.6	0.2	0.5	4.19	0.7	0.1	5.41	100	I	RGLK
3.1	1.54	14.5	66.6	0.3	0.6	5.24	0.96	0.2	7.04	100	J	RGLK
2.9	1.56	14.4	66.9	0.4	0.6	5.33	0.85	0.3	6.81	100	J	RGLK
3	1.58	14.6	66.7	0.3	0.6	5.35	0.88	0.2	6.88	100	J	RGLK
3.2	0.71	15.5	70.7	0.2	4.4	1.97	0.74	0.1	2.55	100	K	feldspar
3	0.57	15.4	71.6	0.3	4.4	1.68	0.53	0.1	2.29	100	K	feldspar
3.1	0.6	15.4	71.6	0.2	4.5	1.68	0.65	0.1	2.29	100	K	feldspar
2.8	0.95	13.3	71.5	0.2	0.5	4.18	0.59	0.2	5.91	100	L	RGLK
2.9	0.92	13.2	71.6	0.2	0.5	4.08	0.73	0.2	5.66	100	L	RGLK
2.8	0.95	13.1	71.4	0.3	0.5	4.07	0.72	0.2	5.92	100	L	RGLK
2.9	1.06	13.1	72.1	0.2	0.4	4.13	0.63	0	5.4	100	M	RGLK
2.8	1.08	13.4	71.7	0.3	0.4	4.15	0.6	0.2	5.43	100	M	RGLK
2.9	0.99	13.3	72.1	0.3	0.5	4.11	0.6	0.1	5.18	100	M	RGLK
2.6	1.96	14.2	64.4	0.2	0.5	6.29	0.97	0.3	8.74	100	N	DGLK
2.7	1.54	15.2	64.3	0.1	0.5	6.55	0.81	0.2	8.17	100	N	DGLK
3	1.24	16.2	64.5	0.3	0.6	6.48	0.77	0.2	6.7	100	N	DGLK
3.3	0.06	12.3	79.9	0.2	1.4	0.99	0.19	0.1	1.47	100	O	RGMK
3.3	0.06	12.4	79.9	0.1	1.5	1.04	0.1	0.1	1.55	100	O	RGMK
3.4	0.15	12.3	79.6	0.1	1.5	1.06	0.18	0.2	1.55	100	O	RGMK
3	1.2	14.2	69.8	0.3	0.4	4.75	0.74	0.1	5.52	100	P	DGLK
2.9	1.27	14.5	69.1	0.3	0.4	4.92	0.69	0.2	5.78	100	P	DGLK
2.9	1.41	14.4	69.4	0.2	0.4	4.72	0.7	0.1	5.79	100	P	DGLK
5.3	0.09	26.7	57.4	0.1	0.3	9.49	0.06	0	0.58	100	Q	AGLK
3	0.85	14.1	73.7	0.3	2.7	2.2	0.59	0.1	2.5	100	Q	RGMK
2.8	0.59	13.7	74.8	0.3	3	1.98	0.48	0	2.45	100	Q	RGMK
3.4	0.34	13.9	72.6	0.1	1.9	2.59	0.38	0.2	4.68	100	R	RGMK

3.2	0.26	13.8	72.8	0.2	1.9	2.5	0.36	0.1	4.88	100	R	RGMK
3.4	0.35	13.8	72.2	0.3	2	2.7	0.43	0.2	4.8	100	R	RGMK
3.1	0.54	13.8	75.2	0.1	2.5	2.02	0.5	0.1	2.1	100	S	RGMK
3	0.6	13.7	75.1	0.2	2.6	1.97	0.55	0.1	2.33	100	S	RGMK
2.9	0.53	13.7	75.5	0.1	2.6	1.98	0.58	0	2.2	100	S	RGMK
3	0.78	13.3	74	0.2	0.4	3.49	0.52	0.1	4.14	100	T	RGLK
3	0.75	13.2	73.9	0.3	0.4	3.53	0.61	0.1	4.09	100	T	RGLK
2.9	0.68	13.4	74.2	0.3	0.5	3.51	0.57	0	3.9	100	T	RGLK
3.2	0.96	12.8	70.9	0.1	1.7	3.39	0.37	0.3	6.36	100	U	RGMK
3.2	0.48	13.5	72.1	0.1	1.9	2.99	0.39	0.2	5.06	100	U	RGMK
3	0.34	13.6	72.8	0.3	2	2.66	0.38	0.2	4.78	100	U	RGMK
0.2	16.7	2.13	51.5	0	0	6.25	0.6	0.8	21.8	100	V	Pyroxene
4.4	0.12	28.3	53.9	0.1	0	11.8	0.12	0	1.32	100	V	Plag
4.2	0.17	19.4	63.2	0.4	0.6	7.19	1.31	0.1	3.47	100	V	Plag
3.3	0.46	13.7	75.1	0	2.7	1.89	0.56	0.1	2.16	100	W	RGMK
3.5	0.5	13.5	74.6	0.3	2.8	1.99	0.57	0.1	2.2	100	W	RGMK
3.4	0.45	13.8	74.7	0.2	2.8	2.01	0.58	0.1	2.01	100	W	RGMK
4.7	0.1	27.4	55.6	0.1	0.1	10.8	0.04	0	1.1	100	X	Plag
3.2	1.9	14.5	66.1	0.2	0.4	5.51	0.81	0.2	7.18	100	X	DGLK
3.3	1.27	13.8	69.2	0.2	0.4	4.74	0.8	0.2	6.05	100	X	DGLK
3.3	1.18	13.7	69.7	0.1	0.4	4.52	0.77	0.3	6.03	100	Y	DGLK
3.2	1.23	13.8	69.2	0.3	0.5	4.61	0.84	0.2	6.26	100	Y	DGLK
3.5	1.15	13.9	69	0.3	0.5	4.57	0.78	0.2	6.08	100	Y	DGLK
0.1	20.5	2.99	52.2	0.1	0	5.69	0.45	0.6	17.4	100	Z	Pyroxene
4	0.28	27.5	54.2	0	0.1	12.1	0.19	0	1.53	100	Z	Plag
3.5	1.78	22.3	57.4	0.1	0.2	10.8	0.31	0.2	3.41	100	Z	Plag
Interval B3H3 106 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
8.3	0.02	22.9	64.1	0.2	0.2	4.29	0	0	0	100	A	Plag
7.2	0	24.1	61.9	0.1	0.3	6.16	0.08	0	0.12	100	A	Plag
7.6	0	24.4	62.3	0.1	0.3	5.38	0	0	0	100	A	Plag
3	1.9	14.8	63.8	0.1	0.5	5.94	1.02	0.2	8.64	100	AA	DGLK
2.9	1.97	14.7	63.2	0.2	0.6	6.36	0.91	0.1	9.13	100	AA	DGLK
3	1.82	14.9	63.4	0.3	0.7	6.19	0.98	0.2	8.57	100	AA	DGLK
3.9	1.36	12.4	66.4	0	0.7	4.73	1.22	0.1	9.18	100	AB	DGLK
3.2	1.2	12.2	66.4	0.3	0.9	4.92	1.39	0.3	9.32	100	AB	DGLK
3.7	1.19	12.7	67.3	0.3	0.9	4.41	1.18	0.3	8.16	100	AB	DGLK
2.3	4.93	14	55.2	0.2	0.3	9.39	1.21	0.3	12.2	100	AC	AGLK
2.1	4.77	13.7	54.6	0.3	0.4	9.93	1.24	0.2	12.9	100	AC	AGLK
2	4.53	13.5	54.7	0.2	0.4	9.74	1.29	0.3	13.4	100	AC	AGLK
2.6	5.16	13.9	55.6	0.3	0.4	9.08	1.36	0.1	11.5	100	AC	AGLK
4.3	0.03	29.2	53.8	0.1	0.3	11.8	0.01	0	0.53	100	B	Plag
5	0.06	28.6	55.1	0	0.3	10.2	0.14	0.1	0.5	100	B	Plag
4	0.1	29.2	53.9	0.1	0.3	11.8	0.06	0.1	0.52	100	B	Plag

1.2	0.43	12.5	78.5	0.3	1.8	2	0.52	0.1	2.67	100	C	RGMK
1.3	0.41	12.4	78.5	0.3	1.9	2.41	0.38	0.1	2.27	100	C	RGMK
1.2	0.5	12.3	78.2	0.3	2.2	2.34	0.45	0.2	2.45	100	C	RGMK
3.2	2.98	14.8	60.3	0.3	0.3	6.87	1.13	0.3	9.76	100	D	AGLK
2.9	2.77	15.1	60.7	0.3	0.5	6.88	0.95	0.1	9.83	100	D	AGLK
3.1	1.85	15.1	66.4	0.2	0.7	5.37	0.92	0.2	6.25	100	D	DGLK
3.7	0.99	15.6	71.4	0.2	2	2.88	0.44	0.1	2.74	100	E	RGMK
4	1	15.5	71.1	0.3	2.1	2.86	0.53	0.1	2.57	100	E	RGMK
3.2	1.12	15.1	72.1	0.3	2.1	2.93	0.41	0.1	2.63	100	E	RGMK
3.3	1.03	15.6	71.3	0.1	2.1	3.08	0.55	0.1	2.84	100	E	RGMK
3.9	0.7	14.7	73.7	0.2	0.8	2.6	0.45	0.2	2.72	100	F	RGLK
4	0.64	14.7	73.3	0.1	0.9	2.63	0.4	0.2	3.26	100	F	RGLK
3.9	0.69	14.5	73	0.2	1	2.81	0.43	0.1	3.38	100	F	RGLK
3.2	0.69	13.4	73.5	0.2	0.5	3.36	0.55	0.1	4.49	100	G	RGLK
3.1	0.51	13.4	74.4	0.2	0.5	3.1	0.42	0.3	4.02	100	G	RGLK
3.2	0.67	13.4	73.3	0.2	0.6	3.37	0.6	0.1	4.41	100	G	RGLK
2.9	2.52	15	60.8	0.2	0.4	6.94	1.1	0.3	9.82	100	H	AGLK
3.8	2.94	15.3	63.4	0.3	0.5	5.98	0.78	0.2	6.85	100	H	DGLK
3	2.81	14.8	62.3	0.2	0.5	6.59	0.91	0.2	8.78	100	H	DGLK
3.9	3.27	20.9	57.7	0.1	0.2	9.51	0.28	0.1	4.12	100	I	AGLK
3.7	1.68	16	63.5	0.3	0.5	6.16	0.98	0.1	7.16	100	I	DGLK
2.6	2.56	11.7	65.6	0.2	0.5	5.49	0.94	0.3	10.1	100	I	DGLK
3	0.58	10.7	76.5	0.2	0.8	2.16	0.58	0.3	5.09	100	J	RGLK
3.5	0.27	12.1	76.2	0.2	0.8	2.33	0.55	0.1	3.91	100	J	RGLK
3.5	0.32	11.4	76.9	0.4	0.9	2.22	0.55	0.1	3.7	100	J	RGLK
3.5	0.92	13.9	70	0.2	0.6	4.17	0.72	0.1	5.92	100	K	DGLK
2.7	0.82	13.6	69.7	0.3	0.6	4.47	0.87	0.2	6.76	100	K	DGLK
3.1	0.98	13.7	70	0.2	0.7	4.38	0.78	0.2	6.1	100	K	DGLK
3.4	0.93	13.8	69.6	0.3	0.7	4.23	0.6	0.2	6.19	100	K	DGLK
3.3	0.27	29.4	52.5	0.1	0	13.2	0.08	0.1	1.02	100	L	Plag
3.1	0.3	28.6	53.2	0	0.1	13.5	0.21	0	1.03	100	L	AGLK
2.3	1.89	10.5	56.7	0.2	0.7	4.1	1.82	0.3	21.5	100	L	AGLK
2.9	0.46	12.6	76.6	0.2	1	2.38	0.45	0.2	3.26	100	M	RGLK
2.7	0.44	12.6	77	0	1.1	2.3	0.58	0.2	3.24	100	M	RGMK
1.7	0.37	12.3	76.9	0.2	1.8	2.39	0.6	0.2	3.56	100	M	RGMK
2	0.47	12.4	76.9	0.2	2.2	2.24	0.5	0.1	3.14	100	M	RGMK
4.2	0.36	15.3	71.8	0.2	0.5	4.24	0.37	0	3.09	100	N	RGLK
3.4	0.52	13	74.4	0.3	0.6	3.13	0.51	0.2	3.99	100	N	RGLK
3.2	0.43	12.9	75.3	0.2	0.6	2.73	0.67	0.1	3.95	100	N	RGLK
2.8	2.78	15.1	60.4	0.1	0.4	7.4	1.09	0.3	9.61	100	O	AGLK
2.8	2.86	15.5	60.4	0.1	0.4	7.24	1.02	0.2	9.54	100	O	AGLK
2.7	2.83	14.9	60.3	0.2	0.4	7.48	1.07	0.2	9.91	100	O	DGLK
3	1.55	14	68.5	0.3	0.6	5.02	0.88	0.3	5.87	100	P	DGLK
3.4	1.63	14.2	68.1	0.5	0.7	4.93	0.75	0.2	5.59	100	P	DGLK
3.2	1.56	14	68.4	0.3	0.7	4.93	0.8	0.2	5.91	100	P	DGLK

3	0.12	32.1	50.4	0.2	0	13.6	0	0	0.64	100	Q	Plag
2.5	0.22	31.8	49.8	0	0.1	14.9	0	0.1	0.71	100	Q	Plag
2.5	0.14	32.2	49.6	0.1	0.1	14.8	0	0	0.64	100	Q	Plag
5.5	0.07	27.1	57.5	0.1	0.4	9.17	0.02	0	0.22	100	R	Plag
5.7	0.04	26.7	58.3	0.2	0.4	8.53	0	0	0.26	100	R	Plag
5.3	0.06	27	57.4	0	0.4	9.41	0.11	0	0.25	100	R	Plag
5.9	0.08	26.5	58.5	0	0.4	8.2	0.05	0.1	0.22	100	R	Plag
2.8	2.96	14.1	59	0.3	0.5	7.09	1.18	0.3	11.8	100	S	AGLK
2.8	2.88	14.2	59	0.3	0.6	7.03	1.33	0.4	11.6	100	S	AGLK
2.8	2.75	14.5	59	0.2	0.6	7.09	1.29	0.3	11.6	100	S	AGLK
3.3	3.15	15.2	61.4	0	0.4	6.56	0.93	0.1	8.98	100	T	AGLK
3.2	3.1	15.2	61.4	0.1	0.4	6.75	1.02	0.2	8.75	100	T	AGLK
2.9	2.57	14.9	62.4	0.2	0.5	6.74	1.03	0.1	8.72	100	T	AGLK
2.7	3.47	13.6	57.3	0.1	0.5	7.72	1.35	0.3	13.1	100	U	AGLK
2.7	3.45	13.4	57.6	0.2	0.5	7.83	1.3	0.3	12.7	100	U	AGLK
2.4	3.23	13.5	57	0.1	0.5	8.03	1.33	0.3	13.6	100	U	AGLK
0.2	16.2	1.75	54	0.1	0	23.2	0.29	0.2	4.15	100	V	CPX
0.2	15.1	1.77	54.3	0	0	23.9	0.39	0.1	4.19	100	V	CPX
0.4	16.1	2.99	54.8	0.1	0.1	21.4	0.35	0.2	3.63	100	V	CPX
2.7	2.32	12.2	61.9	0.4	0.5	6.3	1.71	0.3	11.6	100	W	AGLK
3	2.23	12.5	62	0.5	0.6	6	1.63	0.3	11.3	100	W	AGLK
3	2.3	12.2	61.4	0.4	0.6	6.31	1.62	0.3	11.9	100	W	AGLK
3	0.84	13.9	71.3	0.3	0.6	3.92	0.6	0.2	5.45	100	X	RGLK
2.9	0.44	13.7	73	0.4	0.8	3.35	0.69	0.2	4.63	100	X	RGLK
2.7	0.58	13.6	73	0.4	0.8	3.71	0.56	0.1	4.61	100	X	RGLK
0	0.02	25.5	40.6	0.1	0	23.1	0	0.6	10.1	100	Y	Plag
0.1	0.05	24.4	40.9	0.1	0	22.7	0.2	0.4	11.2	100	Y	Plag
0.1	0.02	25.8	41	0	0.1	22	0.12	0.7	10.1	100	Y	Plag
3.2	2.12	14.4	65.3	0.3	0.5	5.44	0.98	0.4	7.48	100	Z	DGLK
3.1	2.03	14.6	65	0.2	0.5	5.74	0.93	0.3	7.63	100	Z	DGLK
2.6	2.06	14.3	65.3	0.2	0.6	5.79	0.97	0.2	8.04	100	Z	DGLK
Interval B3H3 106 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
2.4	4.63	14.2	54.7	0.2	0.3	9.03	1.16	0.3	13	100	A	Amphibole
2.4	4.44	14.2	55.1	0.2	0.4	9.05	1.2	0.2	12.8	100	A	Amphibole
2.4	4.55	14.2	55	0.1	0.4	9.02	1.13	0.3	13	100	A	Amphibole
2.3	0.3	12.2	80.1	0.2	0.7	1.99	0.29	0.1	1.88	100	B	RGLK
2.2	0.3	12.2	80.4	0.1	0.8	2.01	0.36	0.1	1.72	100	B	RGLK
2.2	0.29	12.2	80.2	0.1	0.9	1.91	0.33	0.1	1.83	100	B	RGLK
4.9	0.08	28.5	55	0.1	0	11	0.01	0	0.45	100	C	Plag
4.9	0.01	28.7	54.9	0.1	0	10.9	0.05	0.1	0.42	100	C	Plag
4.9	0.04	28.7	54.8	0.1	0.1	11	0.05	0	0.4	100	C	Plag
3.2	1.46	15	67.4	0.2	0.3	5.28	0.79	0.2	6.09	100	D	DGLK
2.7	1.17	13.9	71.7	0.1	0.4	4.24	0.49	0.1	5.12	100	D	DGLK

2.8	1.61	15.2	66.9	0.2	0.4	5.41	0.71	0.2	6.61	100	D	DGLK
2.7	1.04	13.9	71.5	0.2	0.4	3.89	0.56	0.2	5.6	100	E	RGLK
2.9	1.05	13.5	72.3	0.3	0.4	3.97	0.49	0.1	4.99	100	E	RGLK
2.7	0.91	13.2	74	0.1	0.5	3.54	0.43	0.2	4.39	100	E	RGLK
3.2	0.84	15.8	69	0.2	0.4	5.11	0.74	0.1	4.62	100	F	RGLK
2.9	0.91	13.5	71.9	0.3	0.5	4.01	0.66	0.2	5.16	100	F	RGLK
3	0.99	13.4	71.8	0.3	0.5	3.92	0.68	0.3	5.17	100	F	RGLK
4.4	0.09	29.1	53.6	0.1	0	12	0.03	0	0.69	100	G	Plag
4.3	0.03	29.7	53.1	0	0	12.2	0.04	0.1	0.52	100	G	Plag
4.1	0.1	28.9	53.3	0.2	0.1	12.2	0.15	0	0.98	100	G	Plag
2.9	0.66	12.9	75.2	0.2	0.4	3.21	0.61	0.2	3.63	100	H	RGLK
3.1	0.62	12.8	75.7	0.3	0.4	2.86	0.53	0.1	3.65	100	H	RGLK
3.2	0.65	13	74.7	0.2	0.5	3.21	0.58	0.1	3.95	100	H	RGLK
3.1	1.83	14.5	65.5	0.3	0.3	5.66	1	0.3	7.56	100	I	DGLK
3.2	1.79	14.4	65.6	0.4	0.4	5.55	0.96	0.2	7.48	100	I	DGLK
3.1	1.89	14.5	65.6	0.2	0.4	5.67	0.87	0.2	7.6	100	I	DGLK
3	2.89	14.5	60.1	0.3	0.3	7.36	1.22	0.3	10.1	100	J	AGLK
3.1	2.59	15	60.4	0.2	0.4	7.21	1.35	0.3	9.56	100	J	AGLK
3.3	2.63	14.6	61.7	0.2	0.4	6.74	1.14	0.2	9.18	100	J	AGLK
6.7	0	24.1	60.9	0.1	0.4	6.91	0.11	0.1	0.67	100	K	AGLK
6.8	0	22	64.1	0.3	0.9	5.21	0.06	0	0.63	100	K	Plag
7.1	0.05	20.2	67	0.2	1.6	2.92	0.17	0.1	0.79	100	K	Plag
0.1	0.06	0	99.8	0.1	0	0	0	0	0	100	L	Quartz
0.1	0.02	0	99.8	0.1	0	0	0.03	0	0	100	L	Quartz
0	0.02	0.02	99.8	0.2	0	0	0	0	0	100	L	Quartz
4.8	0.21	23.3	61.9	0	0.1	8.1	0.2	0	1.38	100	M	Plag
3	1.09	13.4	72.7	0.4	0.5	3.83	0.63	0.3	4.13	100	M	RGLK
3	0.99	13.5	72.6	0.3	0.5	4	0.82	0.1	4.25	100	M	RGLK
3.3	1.12	13.3	70.5	0.3	0.4	4.32	0.65	0.3	5.7	100	N	RGLK
2.8	1.17	13.6	70.8	0.3	0.5	4.37	0.65	0.1	5.57	100	N	RGLK
2.8	1.26	13.6	70.4	0.3	0.5	4.49	0.67	0.2	5.79	100	N	RGLK
2.8	1.09	13.8	71.4	0.2	0.5	4.25	0.7	0.2	5.12	100	O	RGLK
2.5	1.07	13.4	72.3	0.3	0.6	3.92	0.72	0.2	5.05	100	O	RGLK
2.1	1.14	13	72.5	0.6	0.7	4.14	0.76	0	5.11	100	O	RGLK
2.7	2.84	14.4	59.6	0.3	0.3	7.47	1.17	0.2	11	100	P	AGLK
2.8	2.74	14.5	59.2	0.2	0.4	7.43	1.1	0.3	11.3	100	P	AGLK
2.9	2.68	14.6	60.3	0	0.4	7.18	1.01	0.1	10.7	100	P	AGLK
2.7	2.96	15	60	0.3	0.4	7.28	1.16	0.2	10	100	Q	AGLK
2.7	2.83	15.1	60.4	0.2	0.4	7.23	1.08	0.2	9.86	100	Q	AGLK
2.7	2.85	15.1	60.6	0.2	0.4	7.16	0.95	0.3	9.77	100	Q	AGLK
0.2	15.4	2.52	51.4	0.1	0	18.9	0.49	0.5	10.5	100	R	Pyroxene
0.3	15.2	2.05	51.8	0	0	18	0.47	0.7	11.5	100	R	Pyroxene
0.3	14.4	2.11	51.8	0	0	19.3	0.39	0.5	11.3	100	R	Pyroxene
5	0.12	27.3	56	0	0	10.5	0.03	0.1	0.98	100	S	Plag
4	0.13	27.7	55.8	0.2	0	11.4	0.02	0	0.81	100	S	Plag

3.3	0.7	15.6	65.8	0.2	0.4	5.96	1.05	0.2	6.81	100	S	DGLK
3.4	0.46	12.9	75.2	0.2	0.5	2.91	0.53	0.1	3.8	100	T	RGLK
3.4	0.44	13	75.6	0.1	0.5	2.9	0.35	0.1	3.6	100	T	RGLK
3.4	0.43	13	75.3	0.2	0.5	2.93	0.35	0.2	3.66	100	T	RGLK
2.8	2.58	12.3	64	0.2	0.7	5.1	1.14	0.3	10.9	100	U	DGLK
2.9	1.31	12.3	66.6	0.3	0.7	5.1	1.21	0.3	9.35	100	U	DGLK
2.5	0.27	12.8	78.3	0.3	2.9	1.45	0.24	0.1	1.22	100	V	RGMK
2.6	0.25	12.9	78.4	0.1	2.9	1.49	0.28	0	1.2	100	V	RGMK
2.5	0.23	12.9	78.4	0.2	3	1.35	0.19	0	1.28	100	V	RGMK
2.8	6.06	15.1	51.9	0.3	0.4	10.6	1.5	0.2	11.1	100	W	Basalt Glass
2.8	6.04	15.1	51.9	0.3	0.5	10.4	1.68	0.2	11	100	W	Basalt Glass
2.9	6.05	15	51.7	0.3	0.5	10.5	1.58	0.2	11.2	100	W	Basalt Glass
3.1	0.4	12.7	75.8	0.3	0.5	2.86	0.45	0.1	3.73	100	X	RGLK
3.5	0.49	12.8	75.4	0.1	0.6	2.81	0.36	0	3.92	100	X	RGLK
3.5	0.48	12.7	75.5	0.1	0.6	2.82	0.45	0.1	3.74	100	X	RGLK
3.2	2.67	15	60.6	0.3	0.4	7	1.03	0.3	9.55	100	Y	AGLK
3.2	2.62	15	61.1	0.4	0.4	6.91	1.05	0.3	9.02	100	Y	AGLK
3	2.77	14.6	60.4	0.2	0.4	7.23	0.91	0.2	10.2	100	Y	AGLK
3.5	0.42	13	75.7	0.1	0.5	2.73	0.27	0.1	3.69	100	Z	RGLK
3.2	0.43	12.5	75.8	0.4	0.6	2.79	0.41	0.3	3.61	100	Z	RGLK
2.8	0.43	13	75.5	0.2	1	2.85	0.42	0.2	3.74	100	Z	RGLK
Interval B5H2 99-102 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
3.4	1.12	13.7	69.7	0.2	0.6	4.34	0.82	0.1	6.01	100	A	DGLK
2.9	1.08	13.4	70.5	0.3	0.6	4.39	0.72	0.1	6.12	100	A	RGLK
2.8	1.17	13.4	69.5	0.2	0.7	4.61	0.68	0.2	6.71	100	A	DGLK
2.9	0.37	13.1	77.5	0.2	2.6	1.5	0.35	0	1.48	100	AA	RGMK
2.6	0.32	12.9	77.7	0.3	2.6	1.56	0.36	0	1.69	100	AA	RGMK
2.5	0.34	12.7	77.8	0.2	2.7	1.64	0.31	0.1	1.66	100	AA	RGMK
3.2	1.29	14.1	70.2	0.1	0.4	4.12	0.75	0.1	5.65	100	AB	RGLK
2.8	1.37	13.4	69.9	0.2	0.5	4.59	0.81	0.2	6.12	100	AB	DGLK
2.5	1.21	13.3	70.4	0.2	0.6	4.64	0.82	0.1	6.28	100	AB	RGLK
3	0.42	13.3	77.2	0.2	2.4	1.56	0.38	0	1.49	100	AC	RGMK
2.6	0.34	12.9	78	0.2	2.6	1.59	0.28	0	1.49	100	AC	RGMK
2.6	0.31	12.9	77.6	0.1	2.7	1.72	0.4	0.1	1.59	100	AC	RGMK
3.1	0.38	13.1	77.6	0.2	2.4	1.56	0.3	0.1	1.24	100	AD	RGMK
3	0.25	13.2	77.7	0	2.5	1.48	0.29	0	1.59	100	AD	RGMK
3	0.39	13.3	77.4	0.1	2.6	1.59	0.24	0.1	1.28	100	AD	RGMK
2.2	0.31	12.8	77.9	0.2	2.7	1.72	0.46	0.1	1.75	100	AD	RGMK
3	1.09	13.7	70.2	0.3	0.5	4.23	0.71	0.3	5.92	100	B	RGLK
2.8	1.11	13.5	70.7	0.2	0.6	4.17	0.66	0.1	6.21	100	B	RGLK
3	1.1	13.7	70.2	0.3	0.6	4.23	0.64	0.2	6.01	100	B	RGLK
3.1	0.35	13.3	77.5	0.2	2.4	1.51	0.26	0.2	1.28	100	C	RGMK
2.8	0.34	12.9	77.8	0.2	2.6	1.45	0.27	0.1	1.55	100	C	RGMK

2.2	0.29	12.7	78.1	0.2	2.7	1.64	0.38	0.1	1.66	100	C	RGMK
3.7	0.28	12.8	78.7	0.1	1	1.8	0.21	0	1.37	100	D	RGLK
3.7	0.25	13.1	78.2	0.3	1	1.83	0.2	0.1	1.42	100	D	RGLK
3.4	0.43	13	78	0.2	1	2.04	0.14	0.1	1.7	100	D	RGLK
3.6	1.07	14.2	72.6	0.2	0.5	3.41	0.61	0.1	3.62	100	E	RGLK
3.3	1.05	13.9	72.6	0.3	0.5	3.53	0.56	0.2	4.23	100	E	RGLK
2.8	0.92	13.9	72.1	0.3	0.6	3.97	0.73	0.3	4.41	100	E	RGLK
3.2	0.98	13.1	71.4	0.3	0.3	3.95	0.73	0.2	5.93	100	F	RGLK
3	0.84	13.3	71.3	0.2	0.4	4.2	0.57	0.3	5.95	100	F	RGLK
3.1	0.94	13.3	71.3	0.3	0.4	4.03	0.64	0.2	5.86	100	F	RGLK
2.1	0.78	12.6	70.8	0.2	0.4	4.74	0.73	0.3	7.38	100	F	RGLK
2.9	1.36	13.3	68.9	0.1	0.3	4.98	0.82	0.2	7.06	100	G	DGLK
3.7	1.51	13.7	68.4	0.4	0.4	4.46	0.77	0.2	6.43	100	G	DGLK
3	1.32	13.1	70.5	0.4	0.4	4.42	0.8	0.3	5.7	100	G	RGLK
3	0.82	13	73.2	0.3	0.6	3.46	0.54	0.3	4.89	100	H	RGLK
3	0.73	12.9	73.2	0.3	0.6	3.33	0.64	0.2	5.16	100	H	RGLK
2.6	0.72	12.7	73.8	0.3	0.6	3.5	0.48	0.3	5.07	100	H	RGLK
3.1	0.32	13	77.8	0.2	2.3	1.45	0.31	0.1	1.34	100	I	RGMK
2.8	0.33	12.9	78.1	0.2	2.5	1.64	0.28	0	1.46	100	I	RGMK
2.8	0.38	12.7	78.2	0.1	2.6	1.51	0.28	0.1	1.42	100	I	RGMK
3.3	1.18	13.7	69.8	0.3	0.6	4.35	0.69	0.2	5.84	100	J	DGLK
3.3	1.01	13.7	70	0.3	0.6	4.32	0.71	0.2	5.83	100	J	RGLK
3.1	1.12	13.6	69.6	0.4	0.6	4.49	0.62	0.3	6.17	100	J	DGLK
3.1	0.35	12.5	78.3	0.3	2.4	1.5	0.3	0	1.3	100	K	RGMK
2.6	0.38	12.8	78	0.3	2.7	1.48	0.35	0.1	1.34	100	K	RGMK
2	0.46	11.9	79	0.2	2.7	1.63	0.42	0.1	1.62	100	K	RGMK
3.7	0.56	13.8	73.1	0.3	0.9	2.81	0.44	0.2	4.2	100	L	RGLK
3.8	0.6	14.1	73.2	0.4	0.9	2.75	0.38	0.2	3.77	100	L	RGLK
3.7	0.59	13.8	73.7	0.2	0.9	2.73	0.4	0.1	3.96	100	L	RGLK
3.4	1.32	13.5	71.5	0.3	0.5	3.63	0.64	0.3	4.94	100	M	RGLK
2.9	1.11	13.1	72.4	0.2	0.6	3.77	0.64	0.1	5.11	100	M	RGLK
2.8	1.13	13	71.6	0.4	0.6	4.06	0.69	0.3	5.49	100	M	RGLK
3	1.28	13.9	70.8	0.1	0.6	4.06	0.71	0.1	5.56	100	N	RGLK
3.2	1.44	13.7	70.3	0.3	0.6	4.16	0.65	0.2	5.53	100	N	RGLK
3.1	1.2	13.6	70.8	0.2	0.6	4.14	0.76	0.2	5.43	100	N	RGLK
3.3	0.1	12.7	79.8	0.1	2.7	0.62	0.01	0.1	0.62	100	O	RGMK
3.1	0.12	12.6	79.6	0.1	2.9	0.62	0.08	0.2	0.8	100	O	RGMK
2.8	0.16	12.4	79.9	0.2	3	0.71	0.1	0	0.7	100	O	RGMK
2.9	0.35	13.2	77.3	0.2	2.4	1.47	0.42	0.2	1.51	100	P	RGMK
2.7	0.33	13	78.2	0.1	2.5	1.49	0.37	0	1.39	100	P	RGMK
3.2	0.3	13.2	77.4	0	2.6	1.4	0.43	0	1.56	100	P	RGMK
3	1.53	12.5	77.6	0.2	2.4	1.32	0.27	0	1.19	100	Q	RGMK
2.9	0.31	12.8	78	0.3	2.5	1.51	0.21	0	1.47	100	Q	RGMK
2.2	0.3	12	78.9	0.3	2.5	1.62	0.5	0.1	1.67	100	Q	RGMK
1.3	0.1	33.8	47.3	0.1	0	16.6	0.05	0	0.82	100	R	Plag

1.2	0.08	32.9	49.2	0	0	15.9	0.04	0	0.75	100	R	Plag
1.4	0.05	33.6	47	0	0	17.1	0.03	0	0.84	100	R	Plag
3.7	1.07	13.5	70.4	0.3	0.5	4.19	0.66	0.2	5.57	100	S	RGLK
3	0.96	13.4	71	0.3	0.5	4.18	0.67	0.2	5.74	100	S	RGLK
2.9	1.03	13.3	71.5	0.3	0.6	4.02	0.61	0.2	5.55	100	S	RGLK
2.7	1.08	13.1	71.9	0.1	0.5	4.02	0.79	0.1	5.59	100	T	RGLK
3.3	1.21	13.7	71.1	0.1	0.6	3.96	0.67	0.2	5.22	100	T	RGLK
2.6	1.1	13.3	70.6	0.2	0.7	4.39	0.75	0.3	6.06	100	T	RGLK
3.2	0.29	13.3	77.7	0.1	2.4	1.37	0.31	0.1	1.29	100	U	RGMK
2.8	0.38	12.7	78.3	0.2	2.4	1.53	0.26	0.1	1.38	100	U	RGMK
2.9	0.41	12.8	78.1	0.2	2.5	1.41	0.34	0	1.46	100	U	RGMK
3.2	0.56	13.6	76.4	0.3	0.5	2.58	0.37	0.1	2.37	100	V	RGLK
3.3	0.48	13.7	76.6	0.2	0.6	2.5	0.3	0.1	2.2	100	V	RGLK
2.9	0.5	13.6	76.8	0.1	0.6	2.63	0.32	0.1	2.33	100	V	RGLK
3.2	0.39	13.1	77.6	0.1	2.4	1.44	0.33	0.1	1.4	100	W	RGMK
2.6	0.34	13	77.9	0.2	2.5	1.56	0.29	0.1	1.53	100	W	RGMK
3	0.36	12.9	77.8	0.3	2.5	1.34	0.27	0	1.47	100	W	RGMK
3.1	0.18	12.7	78.3	0.2	3.2	0.81	0.16	0.1	1.14	100	X	RGMK
2.9	0.13	13.2	78	0.1	3.5	0.85	0.09	0	1.24	100	X	RGMK
2.5	0.09	13	78.1	0	4	0.72	0.18	0.1	1.23	100	X	RGMK
2.5	0.87	13.3	72.4	0.3	0.5	3.93	0.72	0.3	5.22	100	Y	RGLK
2.8	0.94	13.5	72.6	0.3	0.5	3.79	0.53	0.1	5.02	100	Y	RGLK
3.3	0.9	13.6	72.6	0.3	0.6	3.6	0.59	0.1	4.4	100	Y	RGLK
2.8	0.97	13.9	71.4	0.3	1.6	3.81	0.77	0.2	4.28	100	Z	RGMK
2.8	0.94	14.1	71.8	0.3	1.7	3.33	0.75	0.1	4.12	100	Z	RGMK
2.7	1	14	71.2	0.3	1.7	3.74	0.87	0.1	4.47	100	Z	RGMK
Interval B6H1 1-4 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
2.9	1.89	14	64.3	0.3	0.4	6.19	0.77	0.3	9.03	100	A	DGLK
3	1.73	14.3	64.5	0.3	0.5	5.85	0.72	0.3	8.91	100	A	DGLK
2.9	1.85	14.8	64.2	0.3	0.5	6.15	0.75	0.1	8.47	100	A	DGLK
4.4	0.17	12.3	78.9	0.1	1.4	1.17	0.1	0.1	1.27	100	AA	RGMK
4.3	0.17	12.2	79	0.1	1.5	1.19	0.12	0.2	1.29	100	AA	RGMK
3.5	0.23	12.3	79.5	0.2	1.6	1.22	0.05	0.1	1.29	100	AA	RGMK
3.3	0.41	12.2	77.4	0.1	1	2.34	0.36	0.1	2.8	100	AB	RGMK
3.2	0.49	12	77.6	0.2	1.1	2.23	0.52	0	2.78	100	AB	RGMK
2.8	0.49	12	77.5	0.2	1.2	2.51	0.39	0	2.94	100	AB	RGMK
3.7	0.16	12.4	79.2	0	1.6	1.25	0.18	0.1	1.46	100	AC	RGMK
3.7	0.21	12.3	78.9	0.2	1.6	1.32	0.22	0.2	1.35	100	AC	RGMK
3.7	0.22	12.3	78.9	0.1	1.8	1.42	0.19	0.1	1.29	100	AC	RGMK
3.4	0.31	13.3	74.4	0.2	0.8	2.95	0.25	0.1	4.35	100	B	RGLK
3.9	0.3	13.3	73.5	0.3	0.8	2.9	0.4	0.2	4.43	100	B	RGLK
2.8	0.32	13.2	74.6	0.3	0.8	2.87	0.28	0.2	4.67	100	B	RGLK
3.4	0.22	12.4	79.2	0.2	1.3	1.46	0.24	0.2	1.4	100	C	RGMK

3.3	0.27	12.4	79.1	0.1	1.4	1.52	0.2	0.1	1.48	100	C	RMGK
4	0.25	12.5	78.7	0.4	1.7	1.36	0.06	0	1.14	100	C	RGMK
3.8	0.21	12.3	79.4	0.1	1.5	1.15	0.16	0	1.46	100	D	RGMK
3.6	0.19	12.2	79	0.3	1.6	1.14	0.3	0.1	1.54	100	D	RGMK
3	0.14	12.4	79.4	0.3	1.9	1.21	0.11	0.1	1.46	100	D	RGMK
3.5	0.2	12.2	79.2	0.1	1.3	1.35	0.35	0.1	1.78	100	E	RGMK
3.7	0.22	12.1	79	0.2	1.3	1.3	0.28	0.1	1.83	100	E	RGMK
3.2	0.13	12.3	79.4	0.2	1.3	1.3	0.28	0.1	1.75	100	E	RGMK
4.5	0.21	13.2	73	0.2	0.8	2.86	0.43	0.1	4.64	100	F	RGLK
4.3	0.27	13.1	73.8	0.2	0.9	2.78	0.36	0.1	4.28	100	F	RGLK
4.3	0.2	13.2	73.5	0.1	0.9	2.76	0.29	0.2	4.57	100	F	RGLK
4.2	0.14	12.4	78.8	0.1	1.4	1.37	0.2	0	1.43	100	G	RGMK
4.4	0.24	12.3	78.6	0.2	1.5	1.29	0.21	0.1	1.19	100	G	RGMK
3.9	0.16	12.4	79.1	0.1	1.5	1.28	0.13	0.1	1.43	100	G	RGMK
4	0.14	12.4	79.3	0.2	1.4	1.19	0.08	0	1.21	100	H	RGMK
4	0.17	12.4	78.8	0.1	1.5	1.29	0.25	0.1	1.35	100	H	RGMK
4.1	0.18	12.3	79	0.2	1.6	1.22	0	0.1	1.32	100	H	RGMK
3.6	1.58	14	67.3	0.2	0.5	5.27	0.79	0.2	6.68	100	I	DGLK
3.7	1.61	14.1	67.3	0.2	0.5	5.19	0.78	0.3	6.51	100	I	DGLK
3.6	1.53	14.3	67	0.2	0.5	5.34	0.81	0.3	6.56	100	I	DGLK
4.4	0.23	12.1	78.8	0.1	1.5	1.29	0.26	0	1.31	100	J	RGMK
4.4	0.17	12.4	78.5	0.2	1.5	1.27	0.16	0.2	1.33	100	J	RGMK
4.2	0.2	12.3	78.6	0.1	1.7	1.4	0.13	0.1	1.33	100	J	RGMK
4.3	0.11	12.3	78.9	0.1	1.4	1.36	0.24	0	1.32	100	K	RGMK
4.2	0.18	12.2	78.8	0.1	1.4	1.32	0.2	0.1	1.48	100	K	RGMK
4.3	0.14	12.3	78.9	0	1.5	1.37	0.2	0	1.31	100	K	RGMK
3.9	0.22	12.7	78.8	0	1.3	1.42	0.22	0	1.36	100	L	RGMK
4.1	0.17	12.3	78.7	0.2	1.5	1.44	0.18	0.1	1.46	100	L	RGMK
4.3	0.23	12	78.9	0.1	1.5	1.38	0.17	0.1	1.29	100	L	RGMK
3.8	1.62	14.4	67.7	0.2	0.5	4.78	0.86	0.1	6.05	100	M	DGLK
3.5	1.55	14.2	67.7	0.2	0.5	5.15	0.84	0.3	6.31	100	M	DGLK
3.7	1.64	14.2	67	0.1	0.5	5.14	0.91	0.2	6.57	100	M	DGLK
3.3	0.93	13.1	70.6	0.1	0.6	4.39	0.54	0.2	6.21	100	N	DGLK
3.7	0.89	13.6	69.8	0.1	0.6	4.58	0.62	0.1	6.05	100	N	DGLK
3.4	0.83	13.3	70.5	0.2	0.6	4.48	0.6	0.2	5.9	100	N	DGLK
4.5	0.33	13.1	76.5	0.1	1.3	2.1	0.26	0	1.77	100	O	RGMK
4.6	0.45	13.1	76.4	0.2	1.3	1.91	0.32	0	1.71	100	O	RGMK
4.6	0.38	13	76.4	0	1.4	2	0.29	0.1	1.79	100	O	RGMK
3.8	1.1	14	69.6	0.2	0.5	4.45	0.69	0.3	5.36	100	P	DGLK
3.6	1.11	14.1	70.2	0.2	0.5	4.42	0.56	0.1	5.27	100	P	DGLK
3.8	1.07	14	69.8	0.2	0.5	4.39	0.67	0.2	5.26	100	P	DGLK
4.4	0.17	12.4	78.6	0.1	1.4	1.31	0.28	0.1	1.33	100	Q	RGMK
4.5	0.15	12.2	78.6	0.3	1.5	1.25	0.13	0.1	1.4	100	Q	RGMK
4.3	0.3	12.2	78.4	0.3	1.8	1.36	0.15	0	1.33	100	Q	RGMK
4.4	0.17	12.3	78.8	0.1	1.5	1.2	0.17	0	1.34	100	R	RGMK

4.1	0.16	12.2	79.1	0.2	1.5	1.32	0.16	0.1	1.27	100	R	RGMK
4.1	0.18	12.5	78.9	0.1	1.5	1.29	0.14	0.1	1.27	100	R	RGMK
4.3	0.18	12.5	78.5	0.1	1.4	1.48	0.25	0.1	1.33	100	S	RGMK
4.4	0.19	12.3	78.6	0	1.4	1.43	0.31	0.1	1.29	100	S	RGMK
3.9	0.2	12.3	78.7	0.2	1.6	1.4	0.14	0.1	1.49	100	S	RGMK
3.8	0.27	12.1	79	0.2	1.3	1.36	0.28	0	1.68	100	T	RGMK
3.8	0.26	12.2	78.8	0.1	1.4	1.41	0.27	0.1	1.67	100	T	RGMK
3.4	0.26	12.2	79.1	0.1	1.5	1.48	0.27	0.1	1.5	100	T	RGMK
3.7	0.2	12.3	79.4	0.1	1.5	1.28	0.26	0.1	1.32	100	U	RGMK
4.1	0.18	12.1	79.2	0.1	1.6	1.25	0.24	0.1	1.22	100	U	RGMK
3.9	0.19	12.4	78.9	0.1	1.8	1.25	0.17	0	1.36	100	U	RGMK
3.8	0.23	12.2	78.3	0.2	2.4	1.25	0.2	0.2	1.31	100	U	RGMK
3.8	0.19	12.4	79.4	0	1.4	1.26	0.15	0.1	1.35	100	V	RGMK
4	0.14	12.2	79.2	0	1.5	1.33	0.19	0	1.39	100	V	RGMK
4.3	0.19	12.2	78.7	0.1	1.6	1.25	0.16	0.1	1.51	100	V	RGMK
4.1	0.16	12.4	78.3	0	1.5	1.32	0.8	0.1	1.28	100	W	RGMK
3.8	0.23	12.4	79.2	0	1.6	1.31	0.24	0	1.28	100	W	RGMK
3.8	0.16	12.4	79.1	0.1	1.7	1.3	0.16	0	1.29	100	W	RGMK
3.9	0.16	12.4	78.9	0	1.5	1.41	0.12	0.1	1.46	100	X	RGMK
4.3	0.23	12.2	78.9	0.1	1.5	1.32	0.22	0.1	1.23	100	X	RGMK
4	0.19	12.5	78.5	0.1	1.8	1.35	0.18	0.1	1.41	100	X	RGMK
4	0.23	12.5	79	0	1.4	1.21	0.14	0.1	1.41	100	Y	RGMK
3.8	0.17	12.3	79.3	0.1	1.5	1.31	0.18	0.1	1.45	100	Y	RGMK
3.7	0.16	12.4	79.1	0.1	1.6	1.38	0.2	0.2	1.28	100	Y	RGMK
3.7	0.25	12.4	79.3	0.1	1.4	1.36	0.21	0	1.38	100	Z	RGMK
4.3	0.18	12.5	78.7	0.1	1.5	1.34	0.14	0	1.26	100	Z	RGMK
4	0.24	12.6	79.1	0	1.5	1.23	0.11	0	1.24	100	Z	RGMK
Interval B6H1 1-4 (Coarse-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
3.1	0.23	12.4	75.8	0.2	0.9	2.6	0.3	0.2	4.47	100	A	RGLK
4.3	0.27	12.8	74.8	0.1	0.9	2.4	0.36	0.1	3.88	100	A	RGLK
3.8	0.18	12.3	76.7	0.2	1.1	2.1	0.28	0.1	3.28	100	A	RGLK
3.2	0.18	28.4	53.8	0.1	0	12.9	0.07	0.1	1.33	100	B	Plagioclase
1.8	3.17	12.5	58.2	0.2	0.5	8.37	1.65	0.3	13.3	100	B	AGLK
1.8	2.31	12	57.1	0.2	0.6	7.17	1.9	0.3	16.6	100	B	AGLK
2.1	1.62	17.1	59.3	0.1	0.3	9.97	0.88	0.1	8.42	100	C	AGLK
2.2	1.57	16.3	59.3	0.2	0.4	9.37	0.82	0.2	9.69	100	C	AGLK
1.7	2.56	12.6	60.5	0.1	0.5	7.82	1.34	0.2	12.6	100	C	AGLK
3.3	0.83	14	73.7	0.3	0.9	2.86	0.73	0.1	3.24	100	D	RGLK
3.5	0.78	14	73.7	0.3	1	2.67	0.74	0.1	3.32	100	D	RGLK
3.3	0.74	13.6	74.4	0.2	1	2.78	0.64	0.2	3.13	100	D	RGLK
1.9	7.34	12.5	57.4	0.1	0.3	7.8	0.83	0.2	11.6	100	E	AGLK
2.7	2.2	16.3	59	0.1	0.3	8.54	0.91	0.2	9.77	100	E	AGLK

1.9	2.66	13.5	59.4	0.2	0.4	7.94	1.15	0.2	12.7	100	E	AGLK
3.9	0.61	14.4	72.6	0.2	2	1.9	0.47	0.1	3.76	100	I	RGMK
3.5	0.5	14.2	72.8	0.2	2	2.01	0.44	0.1	4.25	100	I	RGMK
3.4	0.55	14.2	73.1	0.1	2	1.97	0.51	0	4.12	100	I	RGMK
0.4	0.49	25	36.3	0.1	7.7	0.03	28.2	0.2	1.56	100	J	Rutile Mix
0.4	0.44	25.9	37.8	0.1	8	0.04	25.5	0.1	1.74	100	J	Rutile Mix
0.4	0.56	25.9	35.9	0	8	0.06	27.6	0	1.59	100	J	Rutile Mix
3.1	1.88	13.2	69.8	0.3	0.4	4.97	0.7	0.1	5.63	100	K	RGLK
3.1	1.77	13.1	69.3	0.4	0.4	5.19	0.68	0.1	5.91	100	K	RGLK
3.5	1.92	13.4	69.1	0	0.5	4.97	0.74	0.2	5.66	100	K	RGLK
2.6	2.54	15.2	62	0.2	0.4	6.9	0.72	0.3	9.24	100	L	AGLK
2.4	2.47	15.3	62.2	0.1	0.4	7.06	0.84	0.2	9.1	100	L	AGLK
2.3	2.4	15.3	62.4	0	0.5	7	0.86	0.2	9.08	100	L	AGLK
3.1	0.11	12.3	80.2	0	1.4	0.98	0.23	0	1.68	100	M	RGMK
2.4	0.08	12	80.1	0.1	2.6	0.9	0.14	0.1	1.66	100	M	RGMK
2.3	0.08	12	79.8	0	3.1	1.04	0.08	0	1.58	100	M	RGMK
3.3	0.26	12.4	80.1	0.1	1	1.24	0.2	0.1	1.26	100	N	RGLK
3	0.21	12	80.6	0.3	1.1	1.22	0.21	0.1	1.26	100	N	RGMK
3.2	0.19	12.4	80.1	0.1	1.2	1.3	0.13	0.1	1.24	100	N	RGMK
3	1.71	14.4	67.1	0.2	0.4	5.94	0.63	0.2	6.47	100	O	DGLK
2.8	1.55	14.6	67.1	0.1	0.5	5.95	0.55	0.2	6.6	100	O	DGLK
2.9	1.72	14.3	67.8	0.2	0.5	5.75	0.55	0.2	6.22	100	O	DGLK
2.8	2.14	14.5	64	0	0.4	6.41	1.11	0.1	8.62	100	Q	DGLK
3	2.49	14.1	63.5	0.3	0.4	6.12	1.1	0.1	8.88	100	Q	DGLK
2.8	4.07	14.9	56.1	0.1	0.3	8.44	1.29	0.4	11.6	100	R	AGLK
2.6	3.97	14.6	56.6	0.1	0.3	8.55	1.21	0.3	11.8	100	R	AGLK
2.5	4.01	14.5	56.3	0	0.3	8.52	1.27	0.3	12.3	100	R	AGLK
2.3	3.72	13.5	58.3	0.2	0.2	9.37	1.13	0.3	10.9	100	S	AGLK
2.2	3.61	12.8	59.6	0.2	0.4	8.61	1.29	0.3	11	100	S	AGLK
1.9	4.93	11.8	54.7	0.1	0.4	8.49	1.62	0.4	15.7	100	S	AGLK
0	0.01	0	99.9	0.1	0	0	0	0	0.05	100	T	Quartz
0.1	0.01	0	99.8	0	0	0.03	0.04	0	0.05	100	T	Quartz
0	0	0.02	99.8	0	0.1	0	0	0	0.06	100	T	Quartz
Interval B12F3 25-30 (Fine-Grained Fraction)												
Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Total	Grain	Classification
1.5	0.3	12.7	80.9	0.3	1.7	1.04	0.24	0	1.43	100	A	RGMK
1.5	0.28	12.9	80.1	0.2	1.9	1.08	0.2	0.1	1.83	100	A	RGMK
1.4	0.37	12.9	79.4	0.2	1.9	1.29	0.3	0.1	2.04	100	A	RGMK
3.3	0.25	12.9	78.2	0.2	0.9	1.79	0.26	0.1	2.13	100	AA	RGLK
3.3	0.22	12.8	78.3	0.2	1	1.73	0.13	0.2	2.11	100	AA	RGLK
3.7	0.3	12.9	77.7	0.1	1	1.79	0.24	0.1	2.15	100	AA	RGLK

3.9	0.28	12.3	79	0	0.8	1.48	0.28	0.1	1.84	100	AB	RGLK
3.7	0.22	12.4	78.7	0.1	0.9	1.41	0.29	0.1	2.23	100	AB	RGLK
3.2	0.25	12.2	79.6	0.1	0.9	1.59	0.31	0	1.93	100	AB	RGLK
3.6	0.26	12.6	78.7	0.1	1	1.62	0.2	0.1	1.86	100	AC	RGLK
3.2	0.15	12.3	78.9	0.2	1	1.5	0.37	0.2	2.19	100	AC	RGLK
2.8	0.22	12.6	78.8	0.1	1.1	1.99	0.24	0.1	2.1	100	AC	RGLK
1.3	0.82	12.4	76.9	0.1	1.7	2.21	0.47	0.1	3.93	100	AD	RGMK
1.7	0.58	12.6	76.5	0	2	2.51	0.22	0	3.88	100	AD	RGMK
1.8	0.42	12.5	75.6	0.3	2.1	2.71	0.45	0.1	3.98	100	AD	RGMK
2.8	0.26	11.8	79.7	0.1	1.5	1.26	0.34	0.1	2.06	100	AE	RGMK
2.8	0.23	11.8	79.6	0.1	1.7	1.51	0.18	0.1	1.93	100	AE	RGMK
2.1	0.17	11.6	79.5	0.1	2.4	1.4	0.32	0.2	2.19	100	AE	RGMK
3.6	0.19	12.4	78.6	0.2	1	1.47	0.29	0.1	2.15	100	B	RGLK
3.5	0.21	12.3	78.8	0.3	1	1.4	0.35	0.2	1.93	100	B	RGLK
3.2	0.17	12	79.5	0.1	1.4	1.3	0.35	0.1	1.97	100	B	RGMK
3.4	0.26	12.8	78.5	0.2	0.8	1.6	0.24	0	2.22	100	C	RGLK
3.5	0.22	12.5	78.1	0.3	0.9	1.75	0.2	0.1	2.45	100	C	RGLK
3.8	0.21	12.8	78.2	0	0.9	1.56	0.19	0.2	2.21	100	C	RGLK
3.6	0.29	13	77.4	0.3	0.9	1.73	0.3	0.1	2.42	100	D	RGLK
3.4	0.26	12.7	78.3	0	1	1.6	0.3	0.2	2.23	100	D	RGLK
3.3	0.27	12.7	78.1	0.2	1	1.66	0.32	0.2	2.21	100	D	RGLK
3.3	0.16	12.5	79.1	0.2	0.9	1.45	0.33	0.2	2	100	E	RGLK
3.3	0.1	12.3	79.2	0.1	0.9	1.44	0.31	0.1	2.23	100	E	RGLK
3.3	0.25	12.1	79.3	0.1	1	1.46	0.31	0.2	2.17	100	E	RGLK
3.3	0.22	12.2	79	0.1	0.8	1.52	0.43	0.2	2.16	100	F	RGLK
3.4	0.18	12.6	78.8	0	0.9	1.53	0.31	0.1	2.22	100	F	RGLK
3.6	0.18	12.7	78.4	0.2	0.9	1.66	0.24	0.1	1.99	100	F	RGLK
3.7	0.31	13	77.5	0.2	0.9	1.46	0.33	0	2.52	100	G	RGLK
3.5	0.24	12.8	78.3	0.1	1	1.69	0.33	0.1	1.94	100	G	RGLK
3.1	0.23	12.5	79	0.2	1	1.58	0.22	0.1	1.95	100	G	RGLK
3.7	0.21	12.1	79.6	0	0.9	1.25	0.26	0	2	100	H	RGLK
3.2	0.36	11.7	80.1	0.1	1	1.34	0.23	0.1	1.98	100	H	RGLK
3.3	0.21	11.8	79.4	0.4	1	1.76	0.28	0.1	1.79	100	H	RGLK
3.3	0.33	12.5	78.7	0.2	0.9	1.67	0.23	0.2	2.11	100	I	RGLK
3.5	0.24	12.6	78.6	0.2	0.9	1.65	0.24	0.1	2.09	100	I	RGLK
3.3	0.21	12.3	79.4	0	0.9	1.48	0.25	0.1	2.08	100	I	RGLK
3.5	0.23	12.1	79.5	0.1	0.9	1.46	0.26	0.1	1.97	100	J	RGLK
3.6	0.23	12.1	79.4	0	0.9	1.34	0.27	0.1	2.07	100	J	RGLK
3.4	0.2	12.1	79.1	0	0.9	1.5	0.33	0.2	2.1	100	J	RGLK
3.4	2.77	15	60.1	0.5	1.6	5.83	1.32	0.2	9.26	100	K	RGMK
3.3	2.82	14.5	60.2	0.5	1.8	6.04	1.44	0.1	9.4	100	K	RGMK
3.3	2.55	14.7	59.9	0.4	1.8	6.3	1.19	0.3	9.57	100	K	RGMK
3.3	0.17	12	79.6	0.1	1	1.48	0.37	0.1	2.05	100	L	RGLK
3.1	0.27	12	79.5	0.1	1	1.45	0.37	0.2	2.03	100	L	RGLK
3.3	0.22	12.1	78.9	0.2	1	1.58	0.28	0.1	2.26	100	L	RGLK

3.3	0.29	11.8	79.7	0	0.9	1.5	0.23	0.1	2.15	100	M	RGLK
3.3	0.29	12.6	78.9	0.1	1	1.47	0.23	0.1	2.01	100	M	RGLK
3.1	0.23	12.3	79.3	0.2	1	1.4	0.25	0.2	2.07	100	M	RGLK
3.6	0.21	12.3	79.1	0	0.9	1.54	0.36	0.2	1.9	100	N	RGLK
3.7	0.25	12.3	78.7	0	0.9	1.61	0.3	0.2	2.12	100	N	RGLK
3.5	0.21	12.5	78.7	0.1	1	1.51	0.34	0.2	2.02	100	N	RGLK
3.4	0.22	12.4	78.8	0	1	1.55	0.27	0.3	2.06	100	O	RGLK
3.1	0.26	12.1	79.2	0.2	1	1.52	0.29	0.1	2.16	100	O	RGLK
3.2	0.21	12.1	78.8	0.3	1.1	1.62	0.26	0.2	2.15	100	O	RGLK
2.7	0.18	12.1	79.2	0.2	1.2	1.54	0.28	0.1	2.41	100	O	RGMK
3.2	0.32	12.2	79.1	0.2	0.9	1.55	0.19	0.1	2.38	100	P	RGLK
3.5	0.31	12.4	78.7	0.1	0.9	1.56	0.3	0.2	2.01	100	P	RGLK
3.1	0.26	12.4	79	0	1	1.6	0.26	0.1	2.28	100	P	RGLK
3.6	0.19	12.5	78.6	0.1	0.9	1.4	0.27	0.2	2.21	100	Q	RGLK
3.7	0.27	12.7	78	0.1	1	1.52	0.29	0.1	2.29	100	Q	RGLK
3.1	0.19	12.6	78.5	0.3	1.2	1.51	0.28	0.2	2.15	100	Q	RGMK
3.4	0.28	13	78.1	0.2	0.9	1.51	0.24	0	2.34	100	R	RGLK
3.8	0.22	13	77.7	0.1	0.9	1.59	0.34	0.2	2.18	100	R	RGLK
3.5	0.25	12.6	78.5	0	1.1	1.47	0.13	0.1	2.35	100	R	RGLK
3.4	0.31	13.5	77.6	0	0.9	1.91	0.2	0.1	2.15	100	S	RGLK
3.2	0.28	13.1	77.7	0.2	1	1.78	0.38	0.1	2.2	100	S	RGLK
3.4	0.32	13	77.6	0.3	1	1.8	0.41	0.2	2.02	100	S	RGLK
3.5	0.25	12.8	78.2	0.1	0.9	1.61	0.41	0.2	2.05	100	T	RGLK
3.5	0.31	12.5	78.7	0	1	1.57	0.19	0	2.22	100	T	RGLK
2.9	0.24	12.4	78.8	0	1.2	1.54	0.58	0.2	2.23	100	T	RGMK
3.6	0.24	12.7	78.2	0.2	0.9	1.6	0.36	0.2	2.08	100	U	RGLK
3.7	0.21	12.9	77.9	0.1	1	1.66	0.32	0.2	2.08	100	U	RGLK
3.5	0.24	12.7	78.1	0.2	1.1	1.54	0.36	0.1	2.28	100	U	RGLK
3.1	0.2	12.5	78.6	0.1	1	1.52	0.4	0.1	2.46	100	V	RGLK
3.6	0.29	12.8	78.3	0	1.1	1.44	0.29	0.1	2.15	100	V	RGLK
3.2	0.23	12.6	78	0.3	1.8	1.42	0.29	0.3	1.94	100	V	RGMK
3.8	0.28	12.7	78.1	0.1	1	1.49	0.31	0.3	2.12	100	W	RGLK
3.3	0.21	12.7	78.4	0.2	1.1	1.48	0.38	0.2	2.19	100	W	RGLK
3.3	0.28	12.6	78.2	0.2	1.1	1.55	0.33	0.1	2.25	100	W	RGMK
3.9	0.25	12.4	78.5	0.1	0.9	1.48	0.17	0.2	2.27	100	X	RGLK
3.8	0.25	12.7	78.4	0.1	0.9	1.45	0.26	0.1	2.04	100	X	RGLK
3.5	0.16	12.4	78.7	0	1	1.6	0.34	0.2	2.23	100	X	RGLK
3.4	0.26	12.8	78.1	0.1	0.9	1.66	0.32	0	2.46	100	Y	RGLK
3.6	0.27	13	78	0	0.9	1.63	0.29	0.1	2.21	100	Y	RGLK
3.3	0.15	12.5	78.5	0.1	1	1.75	0.31	0.2	2.16	100	Y	RGLK
3.5	0.35	12.4	78.5	0.1	1	1.58	0.31	0.2	2.09	100	Z	RGLK
3.6	0.27	12.6	77.8	0.2	1.2	1.46	0.29	0.2	2.37	100	Z	RGMK
3	0.27	12.3	78.5	0.2	1.7	1.52	0.22	0.2	2.23	100	Z	RGMK